



Zootaxa 4549 (1): 001–066

<https://www.mapress.com/j/zt/>

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Monograph

ISSN 1175-5326 (print edition)

ZOOTAXA

ISSN 1175-5334 (online edition)

<https://doi.org/10.11646/zootaxa.4549.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:A97BF119-20C4-4428-9A00-68DC9F2BE34F>

ZOOTAXA

4549

Chigger mites (Acariformes: Trombiculidae) of Iran

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Magnolia Press
Auckland, New Zealand

Accepted by S. Mironov: 8 Nov. 2018; published: 22 Jan. 2019

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(*Zootaxa* 4549)

66 pp.; 30 cm.

22 Jan. 2019

ISBN 978-1-77670-586-3 (paperback)

ISBN 978-1-77670-587-0 (Online edition)

FIRST PUBLISHED IN 2019 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: magnolia@mapress.com

<https://www.mapress.com/j/zt>

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

Chigger mites of Iran have been revised based on examination of type materials in the collection of Zoological Museum of Moscow University and reference data. Hitherto, 85 species of trombiculids were recorded in Iran; synonymy, diagnoses, data on depositories of type specimens, lists of hosts and collection localities are given for each species. Original measurements of holotypes or paratypes are provided for 46 species. Four new combinations are proposed: *Ornithogastia merops* (Vercammen-Grandjean, Rohde and Mesghali, 1970) **comb. nov.**, transferred from *Guntherana*; *O. oenanthe* (Vercammen-Grandjean, Rohde and Mesghali, 1970) **comb. nov.**, transferred from *Guntherana*; *Microtrombicula galerida* (Vercammen-Grandjean, Rohde and Mesghali, 1970), **comb. nov.**, transferred from *Eltonella*; and *M. meriones* (Vercammen-Grandjean, Rohde and Mesghali, 1970), **comb. nov.**, transferred from *Eltonella*. Comparison of our measurements of holotypes with those given in the original species descriptions published by Kudryashova was carried out using statistical methods to establish probable systematic bias between metric data obtained by different researchers. A key to species of Iranian trombiculid larvae is compiled. With the use of public geoinformation online resources, actual names and coordinates were established for all 48 sites of Iran where chigger mites were collected.

Key words: chiggers, Western Asia, taxonomy, distribution

Introduction

Trombiculids are a diverse group of temporary parasites attacking terrestrial and amphibious vertebrates. Their

parasitic larvae (chiggers) were recorded as usual causative agents of acute dermatitis of humans and domestic animals—from horses, sheep, and goats to poultry and small pets—in many parts of the world. They are known also as specific vectors of scrub typhus, the disease known mainly in Southeast and South Asia, but having much wider areal (Jiang & Richards 2018). As Iran borders with Pakistan, where scrub typhus has been recorded since the second half of 20th century (Traub *et al.* 1967; Wisseman *et al.* 1967), the comprehensive knowledge of chigger fauna and ecology in this country should be regarded as especially important.

Chigger mites of Iran were extensively studied by Kudryashova (1975, 1976a, b, c, d, etc.) on the base of materials collected in 1969–1970 within the frame of a joint project of the Institute of Public Health Research at University of Tehran and the World Health Organization. Collections of mammal hosts and their ectoparasites were carried out by V.M. Neronov (Gamaleya Research Institute of Epidemiology and Microbiology, Moscow, USSR) and A. Farang-Azad (Institute of Public Health Research, Tehran, Iran); preparation and identification of chiggers were done by N.I. Kudryashova (Zoological Museum of Moscow University, USSR) (Kudryashova *et al.* 1978). All results of these investigations were published in Russian, sometimes in poorly accessible sources; therefore, their review is an indispensable base to continue studies of chiggers in Iran.

A noticeable contribution to the knowledge of Iranian chiggers was also provided by Vercammen-Grandjean *et al.* (1970), who described 19 new species and subspecies, mainly from birds, occasionally from reptiles and mammals, and made one new record. A few data on Iranian trombiculids, mainly new species descriptions, were published by Nadchatram & Traub (1971), Goff (1983), Goff & Saboori (1998), Wen & Saboori (2004), and Wen *et al.* (2012).

A systematic bias between measurements of the holotype of *Neotrombicula heptneri* Kudryashova, 1973 in the original description (Kudryashova 1973) and those taken by Stekolnikov (Stekolnikov & Kar 2015) motivate us to perform a statistical analysis aimed to reveal if that bias is a persistent characteristic of metric data obtained by the two researchers and whether it is possible to remove it using a correction rate. Although metric traits play a significant role in the chigger taxonomy at the species level, we do not know works where such difference was a subject of study based on repeated measurements of the same specimens.

A special task was to identify collection localities mentioned in original sources. In Kudryashova's works, Iranian geographic names were given in Russian; later they were simply transliterated with Latin letters (Kudryashova 2004) that is far from correct spelling of toponyms. Thus, many collection sites were defined inexactly, e.g. “48 km from Fesa to Dzhekhrum” (actually 48 km from Fasa in the direction to Jahrom). Therefore, a geographic analysis was needed to establish at least approximate reference points and their coordinates corresponding to collection localities.

Materials and methods

Measurements of holotypes and paratypes (in micrometers, μm) were taken by A.A. Stekolnikov using a compound microscope MBI-3 (LOMO plc, Saint Petersburg, Russia) supplied with phase-contrast optics, which is his permanent device for measuring and drawing. We used the morphological terminology, abbreviations, and diagnostic formulas generally accepted in the taxonomy of trombiculids. The complete guide to this subject was published by Goff *et al.* (1982). The recent monograph on African chiggers (Stekolnikov 2018) includes a shorter compendium containing explanations for all terms used in the present work and equivalents of specific chaetotactic terms used in chigger studies to the common terminology of Prostigmata (Wohltmann *et al.* 2007). Morphological structures of gnathosoma are shown in Fig. 1; idiosoma and legs are presented in Fig. 2 (dorsal aspect) and Fig. 3 (ventral aspect); scutal measurements are given in Fig. 4. The terminology for gnathosomal structures follows Shatrov *et al.* (2016). The meaning of identification formulas used in diagnoses is as follows:

Synthetic identification formula (e.g. SIF = 7BS-N-3-2111.1000) includes the following characters, separated with hyphens and a point: 1) chaetome of palpal tarsus: number of branched setae (B) and presence of nude subterminala (S); 2) condition of galeal seta (B, branched; N, nude; b, bearing small cilium; f, forked); 3) number of prongs of palpal claw; 4) number of genualae I, number of genualae II, number of genualae III, number of tibialae III; 5) number of mastitarsalae III, number of mastitibialae III, number of mastigenualae III or additional genualae III, number of mastifemoralae III.

Palpal setal formula (e.g. fPp = B/B/NNB) describes the form of palpal femoral seta, palpal genual seta, and three palpal tibial setae (dorsal, lateral, and ventral, respectively).

Leg formula (e.g. fsp = 7.7.7) includes number of segments in legs I, II, and III (in six-segmented legs, basifemur and telofemur are fused to form undivided femur).

Sternal setal formula (e.g. fSt = 2.2) includes numbers of anterior and posterior sternal setae.

Coxal setation formula (e.g. fCx = 1.1.1) includes numbers of setae on leg coxae I, II, and III.

Scutal formula (e.g. fSc: PL > AL ≥ AM) expresses the relative lengths of scutal setae.

Dorsal setal formula (e.g. fD = 2H-8-6-6-4-4-2) shows the number of humeral setae (H) and numbers of dorsal idiosomal setae in transverse rows. Humeral setae together with the dorsal idiosomal setae of the 1st row correspond to the row C in the terminology for Prostigmata, while the rows from 2nd to 5th correspond to the rows D, E, F, and H, respectively (Wohltmann *et al.* 2007).

Indexes, measurements of legs, and numbers of idiosomal setae: SD = ASB + PSB; pa—length of leg I (including coxa and excluding claws); pm—length of leg II (including coxa and excluding claws); pp—length of leg III (including coxa and excluding claws); Ip = pa + pm + pp; TaIIIL—length of leg III tarsus (excluding claws); TaIIIW—width of leg III tarsus; DS—number of dorsal idiosomal and humeral setae (excluding scuto-ocular setae, which are situated between lateral scutal margins and eyes in some species); VS—number of preanal and postanal ventral idiosomal setae (sternal and coxal setae do not belong to VS); NDV = DS + VS + number of humeroventral setae (the setae situated between coxae I and II, by sides of idiosoma, in some species).

Diagnoses of species are given according to original descriptions or later revisions and supplied with our measurements of holotypes or paratypes — in cases they were examined. Type specimens from the Zoological Museum of Moscow University were examined by A.A. Stekolnikov; type specimens from Iranian depositories were revised by A. Saboori. Original figures of holotypes or paratypes prepared by A.A. Stekolnikov with the use of a drawing tube are provided for those *Neotrombicula* and *Kepkatrombicula* species which are difficult for identification.

To establish actual names and coordinates of collection localities, we used the database of geographic names supported by the US National Geospatial-Intelligence Agency (<http://geonames.nga.mil/namesgaz/>), program Google Earth (<https://www.google.com/earth/>), and the Soviet military topographic map set of Iran downloaded from the website mapstor.com (<https://mapstor.com>). The list of collection localities is presented in Table 1. The column “Description” contains data on collection sites in the form they were given in the original description of species. Spelling of geographic names follows the recent standard according to the US National Geospatial-Intelligence Agency; texts from Kudryashova’s papers were translated from Russian. The column “Reference point” includes names of exact or arbitrary geographic points being closest to the collection localities; in the case of two different localities connected to one reference point, its name is supplied with a number (e.g. Kerman and Kerman 2). The column “Coordinates” includes latitudes and longitudes of collection localities obtained with the use of Google Earth according to the data on the distance between a reference point and a collection site, description of the landscape at the collection site, and other details. In the paragraph “Distribution” for each species, Iranian localities correspond to reference points from the Table 1.

Host names were verified with the use of online databases Mammal Species of the World (<https://www.departments.bucknell.edu/biology/resources/msw3/>), Zoonomen (Zoological Nomenclature Resource): Birds of the World (<http://www.zoonomen.net/avtax/frame.html>), and the Reptile Database (<http://www.reptile-database.org>). We provide all host records (not only Iranian) for each species.

We used the Sign test and the Wilcoxon Matched Pairs test to estimate the difference between the original measurements of holotypes and our measurements of the same specimens. The both tests are nonparametric alternatives to t-test for dependent samples. The Sign test computes the number of times when the values from the first sample are larger than the corresponding values in the second sample, while the Wilcoxon Matched Pairs test also takes into account the magnitude of the differences between dependent values. The latter test is therefore more sensitive than the former one. Twenty variables representing standard measurements of chigger mites were included separately into the analyses (AW, PW, SB, ASB, PSB, SD, AP, AM, AL, PL, S, H, D_{min}, D_{max}, V_{min}, V_{max}, pa, pm, pp, Ip). The sample size was 44 (i.e., holotypes of 44 species were included into the analyses), but it was reduced for each variable due to numerous missing values. The Wilcoxon test was performed twice—with raw and with log-transformed variables: the results of those analyses were generally similar. Computations were performed in the software package Statistica ver. 8.0 (StatSoft Inc., Tulsa, OK, USA).

TABLE 1. Collection localities.

Reference point	Description	Coordinates	Province
Abarkuh	Abarkuh	31° 07' 44" N, 053° 16' 57" E	Yazd
Abhar	4 km W Abhar, 1750 m a.s.l.	36° 08' 21" N, 049° 08' 45" E	Zanjan
Ahmadabad	10 km SE Kazerun	29° 34' 02" N, 051° 45' 00" E	Fars
Ahvaz	Ahvaz	31° 18' 45" N, 048° 40' 38" E	Khuzestan
Ajami	Vicinities of Ajami, 1430 m a.s.l.; 1780 m a.s.l.	37° 28' 56" N, 047° 12' 54" E	East Azerbaijan
Asadabad	Hamadan, Asadabad, 1800 m a.s.l.	34° 46' 57" N, 048° 07' 12" E	Hamadan
Bandar Abbas	Bandar Abbas	27° 11' 11" N, 056° 16' 51" E	Hormozgan
Behbahan	3 km from Behbahan, 320 m a.s.l., a tributary of the Marun river, slope near the river bank with single trees, tamarisk, and stones; gardens near the river	30° 39' 17" N, 050° 11' 59" E	Khuzestan
Borazjan	10 km N Borazjan, 770 m a.s.l., southern slope of a mountain	29° 19' 03" N, 051° 19' 12" E	Bushehr
Chabahar	4 km N Chabahar, 130 m a.s.l.	25° 20' 27" N, 060° 37' 48" E	Sistan and Baluchestan
Chahar Taq	48 km from Fasa in the direction of Jahrom, 1130 m a.s.l., stony slope of a mountain and thickets of tamarisk along the river; 1130 m a.s.l., bush and stones; 1000-1500 m a.s.l., sandy terraces with bush of tamarisk and stones along the river, alfalfa fields	28° 34' 33" N, 053° 48' 37" E	Fars
Chalus	15 km E Chalus, deciduous forests along the Caspian Sea shore	36° 36' 31" N, 051° 36' 44" E	Mazandaran
Chamm ol Hamid	Khuzestan Province, 45 km N Ahvaz	31° 41' 04" N, 048° 51' 16" E	Khuzestan
Chehel Zar'i	40 km SE Abadeh, Chehel Zar'i, 1570 m a.s.l., stony slopes of mountains	30° 59' 56" N, 052° 54' 55" E	Fars
Chelmir	above a brook in the mountain gorge Chelmir, 27 km E Dargaz, 1000 m a.s.l.	37° 23' 39" N, 058° 52' 07" E	Razavi Khorasan
Darabad	vicinities of Darabad, deciduous forest	37° 20' 14" N, 055° 34' 33" E	Golestan
Darkhovin	45 km N Abadan, Darkhovin, 190 m a.s.l.	30° 44' 40" N, 048° 25' 22" E	Khuzestan
Delijan	16 km N Delijan, Anarbar valley, 1600 m a.s.l., edge of a garden on mountain slope; mountain slope and river terrace; stony and rocky slopes of mountains with small gardens and mountain steppe on river terraces	34° 06' 41" N, 050° 35' 02" E	Markazi
Gorgan	20 km SE Gorgan, deciduous forest	36° 42' 42" N, 054° 35' 27" E	Golestan
Hajiabad	30 km SW Hamadan, 1900 m a.s.l.	34° 37' 17" N, 048° 15' 51" E	Hamadan
Isfahan	Isfahan	32° 39' 26" N, 051° 40' 39" E	Isfahan
Kabudan	137 km SE Sabzevar, 1200 m a.s.l.	35° 22' 36" N, 057° 58' 39" E	Razavi Khorasan
Kabudarahang	Kabutarahang (=Kabudarahang)	35° 12' 33" N, 048° 43' 24" E	Hamadan

.....continued on the next page

TABLE 1. (Continued)

Reference point	Description	Coordinates	Province
Kazerun	Kazerun	29° 37' 10" N, 051° 39' 15" E	Fars
Kazerun 2	20 km E Kazerun, 770 m a.s.l., bush along the river and deposits on river terraces; old fields and gardens	29° 38' 56" N, 051° 47' 21" E	Fars
Kerman	5 km N and 20 km E Kerman, 2220 m a.s.l., stony slopes of mountains with single <i>Pistacia</i> trees and bush	30° 22' 38" N, 057° 14' 38" E	Kerman
Khorramabad	Khorramabad	33° 29' 16" N, 048° 21' 21" E	Lorestan
Kolol	10 km N Borazjan, 120 m a.s.l., bush and old fields on the valley with tributaries of the Helle river	29° 18' 57" N, 051° 05' 31" E	Bushehr
Lotfabad	Lotfabad village, 27 km W Dargaz, garret of old house	37° 31' 05" N, 059° 20' 27" E	Razavi Khorasan
Mahdishahr	4 km S Shamirzad, 1850 m a.s.l.	35° 42' 39" N, 053° 21' 14" E	Semnan
Maku	2 km E Maku, 1000 m a.s.l.	39° 17' 42" N, 044° 29' 54" E	West Azerbaijan
Mashhad	Mashhad	36° 18' 56" N, 059° 34' 05" E	Razavi Khorasan
Mashhad 2	20 km W Mashhad, 1100 m a.s.l.	36° 26' 11" N, 059° 25' 35" E	Razavi Khorasan
Masjed Soleyman	Khuzestan Province, 18 km S Masjed Soleyman	31° 48' 14" N, 049° 19' 10" E	Khuzestan
Mehr	48 km W Sabzevar, 900 m a.s.l., stony slope of a mountain with scarce grass	36° 17' 32" N, 057° 08' 57" E	Razavi Khorasan
Mozdooran cave	96 km E Mashhad, cave Mozdooran near Sarakhs, 1400 m a.s.l.	36° 09' 06" N, 060° 32' 60" E	Razavi Khorasan
Qazvin	Qazvin	36° 16' 47" N, 050° 00' 18" E	Qazvin
Sar Bisheh	Khuzestan Province, 93 km ESE of Behbahan	30° 16' 57" N, 050° 59' 39" E	Kohgiluyeh and Boyer- Ahmad
Sefidrud	valley of Sefidrud river between Lahijan and Rasht	37° 14' 59" N, 049° 49' 42" E	Gilan
Shiraz	20 km from Shiraz to Kazerun, 1640 m a.s.l., stony slopes of mountains	29° 37' 25" N, 052° 14' 17" E	Fars
Shurak Maleki	71 km E Mashhad, 900 m a.s.l., edge of a field in dry riverbed with dense thickets of <i>Agriophyllum</i> and sagebrush	36° 04' 12" N, 060° 13' 27" E	Razavi Khorasan
Shushtar	3 km from Shushtar, Karun valley, 250 m a.s.l.	32° 02' 59" N, 048° 50' 54" E	Khuzestan
Takht Malek	40 km from Nikshahr, dry riverbed with bush, 720 m a.s.l.	26° 26' 44" N, 060° 02' 51" E	Sistan and Baluchestan
Tehran	Tehran	35° 42' 18" N, 051° 25' 18" E	Tehran
Urmia	20 km S Urmia, 1000-1500 m a.s.l.; 1400 m a.s.l., scarce <i>Pistacia</i> forest on stony slopes of mountain; 1400 m a.s.l., fields along a mountain river with scarce trees	37° 22' 01" N, 044° 58' 50" E	West Azerbaijan
Zahedan	14 km NE (in other text SE) Zahedan, 1525 m a.s.l.	29° 29' 47" N, 060° 51' 46" E	Sistan and Baluchestan
Zarrin Shahr	30 km S Isfahan, 1400-1500 m a.s.l., forest edge along the river with bordering rice fields; 1440 m a.s.l., edge of a rice field and river terraces with stoned and trees along the river.	32° 21' 55" N, 051° 30' 42" E	Isfahan

Abbreviations of depositories: IUMS—Iran University of Medical Sciences, Tehran, Iran; USNM—National Museum of Natural History, Washington, DC, USA (formerly United States National Museum); ZMMU—Zoological Museum of Moscow University, Moscow, Russia.

List of host names: MAMMALIA: *Acomys dimidiatus* (Cretzschmar), *Allactaga williamsi* Thomas, *Alticola roylei* (Gray), *Apodemus agrarius* (Pallas), *A. flavicollis* (Melchior), *A. ponticus* (Sviridenko), *A. sylvaticus* (L.), *A. uralensis* (Pallas), *Asellia tridens* (É. Geoffroy), *Barbastella leucomelas* Cretzschmar, *Calomyscus bailwardi* Thomas, *Capra hircus* L., *Chionomys gud* (Satunin), *C. nivalis* (Martins), *Ch. roberti* (Thomas), *Spermophilus fulvus* (Lichtenstein), *Cricetulus migratorius* (Pallas), *Crocidura russula* (Hermann), *C. suaveolens* (Pallas), *Eptesicus bottae egnevi* Bobrinskii, *Gerbillus nanus* Blanford, *Lepus europaeus* Pallas, *Meriones crassus* Sundevall, *M. hurrianae* Jordon, *M. libycus* Lichtenstein, *M. meridianus* (Pallas), *M. persicus* Blanford, *M. tamariscinus* (Pallas), *M. tristrami* Thomas, *M. vinogradovi* Heptner, *Microtus agrestis* (L.), *M. arvalis* (Pallas), *M. daghestanicus* (Shidlovsky), *M. majori* Thomas, *M. schelkovnikovi* (Satunin), *M. socialis* (Pallas), *Mus musculus* L., *Mustela nivalis* L., *Myotis blythii* Tomes, *Nesokia indica* (Gray), *Ochotona rufescens* (Gray), *Pipistrellus pipistrellus* (Schreber), *Rattus pyctoris* Hodgson (syn.: *Rattus turkestanicus*), *R. rattus* (L.), *Rhinolophus ferrumequinum* (Schreber), *Rhinopoma hardwickii* Gray, *Rhombomys opimus* (Lichtenstein), *Sorex araneus* L., *Talpa caucasica* Satunin, *Tatera indica* (Hardwicke); SQUAMATA: *Stellagama stellio* (L.); AVES: *Charadrius alexandrinus* L., *Columba livia* Gmelin, *Coracias garrulus* L., *Corvus cornix* L., *Falco columbarius* L., *Galerida cristata* (L.), *Garrulus glandarius* (L.), *Merops apiaster* L., *Neophron percnopterus* (L.), *Oenanthe hispanica* (L.), *O. picata* (Blyth), *Passer hispaniolensis* (Temminck).

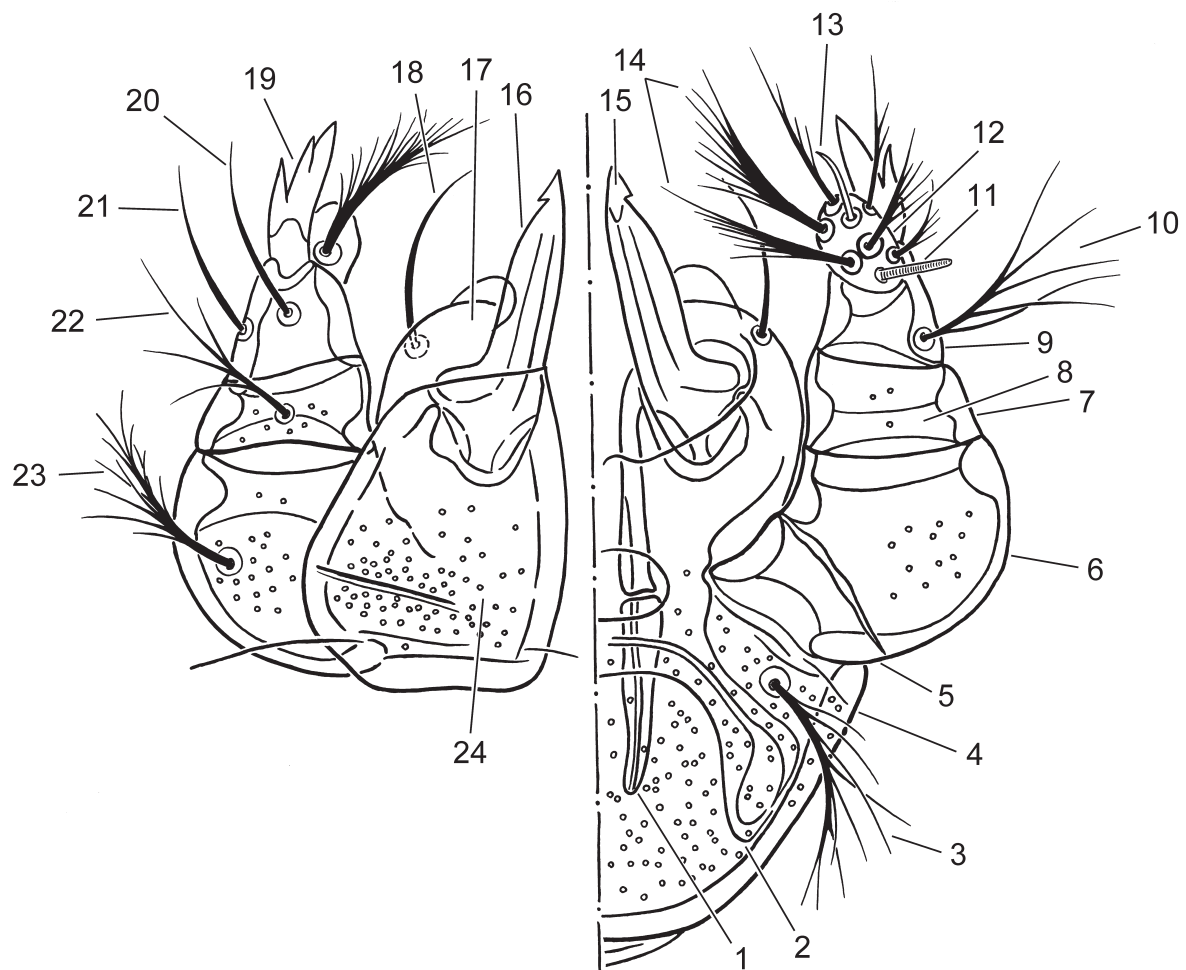


FIGURE 1. Gnathosoma of trombiculid larva (left—dorsal aspect, right—ventral aspect). 1, cheliceral apodeme (or sigmoid piece); 2, capitular apodeme; 3, gnathocoxal seta; 4, gnathocoxa; 5, trochanter of palp; 6, femur of palp; 7, genu of palp; 8, sclerite ring; 9, tibia of palp; 10, ventral palpal tibial seta; 11, palpal tarsala; 12, tarsus of palp; 13, palpal subterminala; 14, palpal tarsal setae; 15, tricuspid cap of cheliceral blade; 16, cheliceral blade; 17, malapophysis; 18, galeal seta; 19, palpal claw; 20, dorsal palpal tibial seta; 21, lateral palpal tibial seta; 22, palpal genual seta; 23, palpal femoral seta; 24, cheliceral base.

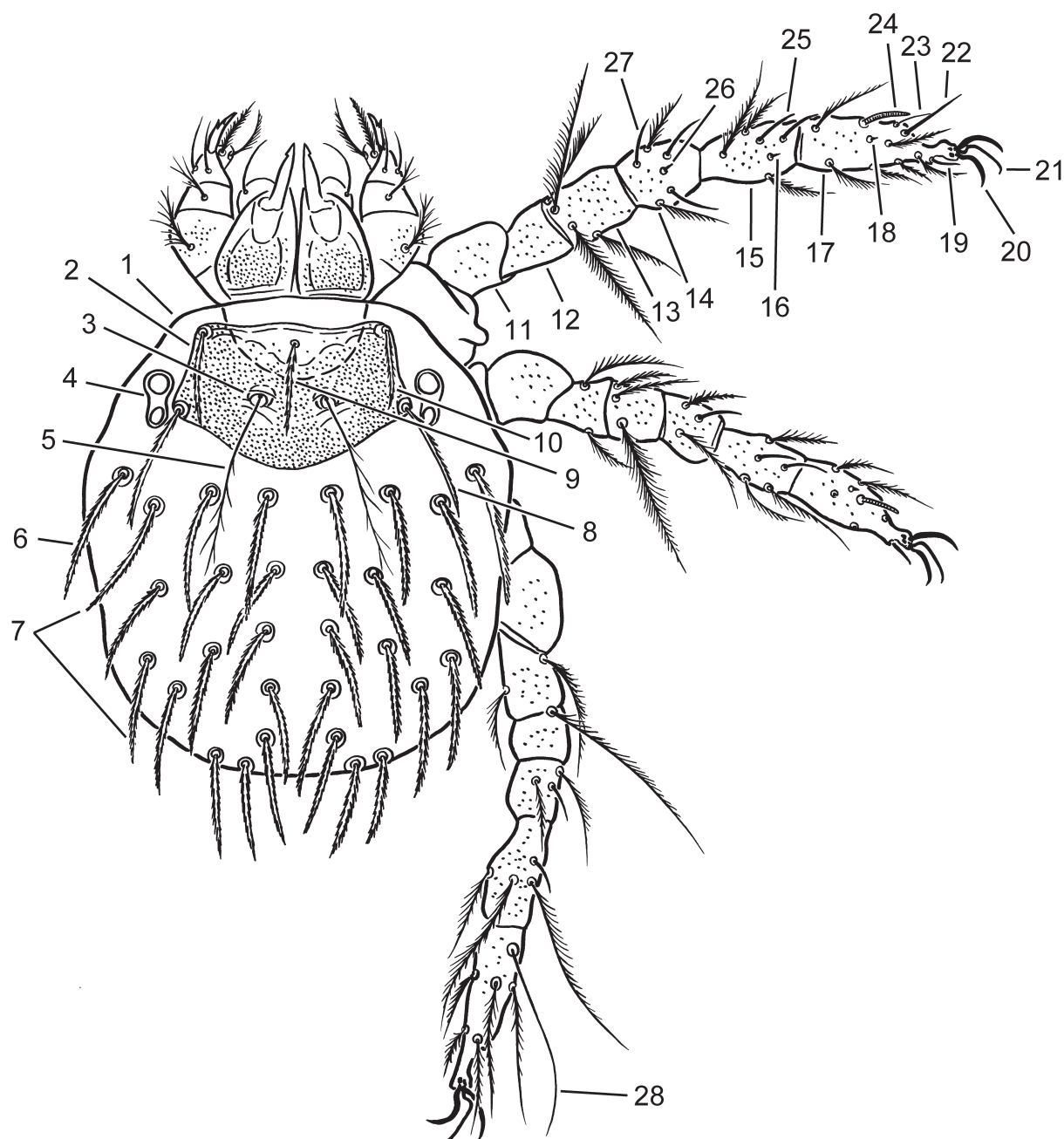


FIGURE 2. General view of trombiculid larva, dorsal aspect. 1, idiosoma; 2, scutum; 3, sensillary base; 4, eyes; 5, sensillum (S); 6, humeral seta (H); 7, dorsal idiosomal setae (D); 8, posterolateral scutal seta (PL); 9, anteromedian scutal seta (AM); 10, anterolateral scutal seta (AL); 11, trochanter; 12, basifemur; 13, telofemur; 14, genu; 15, tibia; 16, microtibia; 17, tarsus; 18, famulus I (f_1); 19, pretarsala I (PT'); 20, claw; 21, empodium; 22, subterminala (ST); 23, parasubterminala (pST); 24, tarsala I (S_1); 25, tibiala; 26, microgenuala; 27, genuala; 28, mastitarsala.

Key to species of Iranian trombiculid larvae

1. Scutum with 2 AM setae, with anteromedian process (nasus), fsp = 6.6.6, fSt = 0.2, sensilla flagelliform (subfamily Leeuwenhoeekiinae) 6
- Scutum without AM setae, fsp = 7.6.6, sensilla expanded, fusiform or clavate (subfamily Gahrlepiinae) 2
- Scutum with 1 AM seta, without nasus, fsp = 7.7.7 (subfamily Trombiculinae) 10
- Scutum with 1 AM seta and nasus, fsp = 7.7.7 (subfamily Apoloniinae) *Womersia irani*
2. Scutum with 2 AL and 2 PL setae only (genus *Walchia*, Fig. 5) 3

-	Scutum with posterior margin extending beyond level of PL setae to include one pair of dorsal idiosomal setae (PPL setae) (genus <i>Schoengastiella</i>)	<i>Schoengastiella irani</i>
3.	Eyes absent, fCx = 1.1.2, palpal tarsus with 5 branched setae, genuala II and genuala III present, f ₁ posterior to S ₁ , NDV = 64.	<i>Walchia irani</i>
-	Eyes 2 + 2, fCx = 1.1.1, palpal tarsus with 4 branched setae, genuala II and genuala III absent, f ₁ at level of S ₁ , NDV = 80–102	4
4.	Eight setae in 1 st row of dorsal idiosomal setae and 11 setae in 2 nd row, NDV = 93–102, lateral palpal tibial seta with 1 barb	<i>Walchia schelkovnikovi</i>
-	Six setae in 1 st row of dorsal idiosomal setae and 8 setae in 2 nd row, NDV = 80–95, lateral palpal tibial seta nude	5
5.	AL ≥ PL, Ip = 542–614	<i>Walchia cognata</i>
-	PL > AL, Ip = 638–647	<i>Walchia montana</i>
6.	ALs and PLs situated close to each other (AP = 9–12); about 5 PPLs situated on posterior scutal margin within scutum and about 5 scuto-ocular setae situated between scutum and eyes (genus <i>Multisetosa</i> , Fig. 6)	<i>Multisetosa persicus</i>
-	AP = 19–31, PPL and scuto-ocular setae absent (genus <i>Odontacarus</i> , Fig. 7)	7
7.	Two genualae I, mastitibiala absent	8
-	One genuala I, mastitibiala present	9
8.	Palpal claw 2-pronged, genuala II and genuala III present, mastitarsala absent, fPp = B/B/BBB, NDV = 128–141, two humeral setae, humeroventral setae absent	<i>Odontacarus efferus</i>
-	Palpal claw 4-pronged, genuala II and genuala III absent, mastitarsala present, fPp = B/B/BNB, NDV = 82, 4 humeral setae, 6 humeroventral setae present between coxae I and II	<i>Odontacarus khanjanii</i>
9.	AM ≥ PL > AL, 8–12 humeroventral setae between coxae I and II, NDV = 141–161, Ip = 1016–1087, f ₁ at level or posterior to S ₁ , f ₂ anterior to S ₂	<i>Odontacarus apricus</i>
-	AM ≥ AL > PL, 12–15 humeroventral setae between coxae I and II, NDV = 191–220, Ip = 1145–1184, f ₁ slightly anterior to S ₁ , f ₂ at level or slightly posterior to S ₂	<i>Odontacarus dignus</i>
10.	Sensilla expanded, fusiform to globose (tribe Schoengastiini)	11
-	Sensilla flagelliform, usually branched (tribe Trombiculini)	42
11.	Tibiala III absent	12
-	Tibiala III present	24
12.	Palpal tarsus with 7 branched setae, scutum wide, band-shaped, more than twice wider than long (genus <i>Euschoengastia</i> , Fig. 8)	<i>Euschoengastia meshhedensis</i>
-	Palpal tarsus with 4 branched setae, scutum less than twice wider than long	13
13.	ALs spiniform, nude (genus <i>Doloisia</i>), fCx = 1.3.10, three mastitarsalae and two mastitibialae present, PLs extrascutal	<i>Doloisia iranensis</i>
-	ALs not spiniform, barbed, number of setae on coxa III not more than 5, mastisetae absent	14
14.	Sensillary bases situated closer to PLs than to each other (genus <i>Schoutedenichia</i> , Fig. 9)	15
-	Sensillary bases situated not closer to PLs than to each other (genus <i>Cheladonta</i> , Fig. 10)	21
15.	Galeala nude, fPp = B/B/NNB	16
-	Galeala branched	20
16.	PLs extrascutal	17
-	PLs inserted on scutum	18
17.	Genuala II and genuala III absent, 6 humeral setae	<i>Schoutedenichia originalis</i>
-	Genuala II and genuala III present, 4 humeral setae	<i>Schoutedenichia zarudnyi</i>
18.	fCx = 1.1.3, AL > PL	<i>Schoutedenichia montchadskyi</i>
-	fCx = 1.1.1, PL > AL	19
19.	Palpal subterminala present, 4 humeral setae, NDV = 162, Ip = 1064, f ₁ far anterior to S ₁ ; f ₂ far posterior to S ₂	<i>Schoutedenichia chilmirica</i>
-	Palpal subterminala absent, 2 humeral setae, NDV = 70, Ip = 684, f ₁ slightly posterior to S ₁ ; f ₂ near S ₂	<i>Schoutedenichia shirazica</i>
20.	Genuala II and genuala III absent, fPp = B/B/NNB	<i>Schoutedenichia anatolica</i>
-	Genuala II and genuala III present, fPp = B/B/BBB	<i>Schoutedenichia rohdeae</i>
21.	Galeala nude	22
-	Galeala branched	23
22.	Palpal claw 6-pronged, Ip = 625–654	<i>Cheladonta brevipalpis ghazvini</i>
-	Palpal claw 3-pronged, Ip > 680	<i>Cheladonta firdousii</i>
23.	Genuala II and genuala III absent, palpal claw 3-pronged, NDV = 112–131, eyes 2 + 2	<i>Cheladonta serrata</i>
-	Genuala II and genuala III present, palpal claw 7-pronged, NDV = 74, eyes 1 + 1	<i>Cheladonta iraniensis</i>
24.	Scutum wide, crescent-shaped, with rounded or concave posterior margin, sensillary bases posterior to PL, AL and PL setae approximate to each other, eyes absent, two or more pairs of humeral setae, scutal and idiosomal setae covered with long thin barbs, galeal setae branched, fCx = 1.1.3 (genus <i>Brunehaldia</i> , Fig. 11)	25
-	Scutum not crescent-shaped, eyes 2 + 2	27
25.	Parasubterminala nude	<i>Brunehaldia schmuteri</i>
-	Parasubterminala with 1–2 branches	26
26.	NDV = 152–176, Ip = 767–835, PW < 80	<i>Brunehaldia iranica</i>

-	NDV = 196–225, Ip = 851–914, PW > 80	<i>Brunehaldia silvatica</i>
27.	Cheliceral blade with row of recurved dorsal teeth and 1 long ventral tooth, 2 ciliated mastitarsalae present (genus <i>Schoengastia</i>)	<i>Schoengastia persica</i>
-	Cheliceral blade with usual tricuspid cap only	28
28.	Tarsala I in distal position (level of subterminala), sensillary bases situated close to each other (at distance equal to diameter of each base) (genus <i>Helenicula</i> , Fig. 12)	29
-	Tarsala I clearly posterior to subterminala, distance between sensillary bases larger than diameter of each base	33
29.	Galeala branched, only 1 genuala I present	30
-	Galeala nude, 2 genualae I	31
30.	fCx = 1.1.3, fSt = 2.4, palpal tarsus with 5 branched setae	<i>Helenicula goodorziani</i>
-	fCx = 1.1.1, fSt = 2.2, palpal tarsus with 4 branched setae	<i>Helenicula kohlsi</i>
31.	fPp = B/B/BNB, fCx = 1.2.4(5), fSt = 2.4(5)	<i>Helenicula sparsa</i>
-	fPp = B/B/BBB, fCx = 1.1.2, fSt = 2.2	32
32.	NDV = 121–136, Ip = 921–982, 14–19 ventrohumeral setae between coxae II and III	<i>Helenicula amicala</i>
-	NDV = 98–109, Ip = 795–848, ventrohumeral setae absent	<i>Helenicula lukshumiae</i>
33.	Palpal tarsus with 7 branched setae and usually subterminala, galeala branched, scutum with cuticular striations around sensillary bases, parasubterminala branched or absent, 1 mastitarsala rarely present, fCx = 1.1.3, 1.1.6 or 1.1.1 (genus <i>Neoschoengastia</i>)	34
-	Palpal tarsus with 5 branched setae, galeala nude, scutum with cuticular striations around sensillary bases, parasubterminala nude, 4 mastitarsalae and 3 mastitibialae present, fCx = 1.1.1 (genus <i>Ornithogastia</i>)	40
-	Palpal tarsus with 5 branched setae, galeala branched, scutum without cuticular striations, parasubterminala nude, mastitarsalae absent, fCx = 1.2.1 (genus <i>Susa</i>)	41
34.	Ip = 774–780, fCx = 1.1.1, palpal subterminala absent, 1 mastitarsala present, fPp = B/B/NBB, AL > PL > AM	<i>Neoschoengastia meshedensis</i>
-	Ip > 1100, fCx = 1.1.3 or 1.1.6, palpal subterminala present, mastitarsala absent, fPp = B/B/BBB or B/B/BNB, PL > AL > AM	35
35.	fCx = 1.1.6, fSt = 2.4, NDV > 300	<i>Neoschoengastia mesghali</i>
-	fCx = 1.1.3, fSt = 2.2, NDV = 60–80	36
36.	Two genualae I	<i>Neoschoengastia elegans</i>
-	Three genualae I	37
37.	Eight setae in 1 st row of dorsal idiosomal setae, NDV = 80	<i>Neoschoengastia kaliophthalma</i>
-	Six setae in 1 st row of dorsal idiosomal setae, NDV = 60–64	38
38.	fPp = B/B/BNB, onychotriches absent	<i>Neoschoengastia galerida</i>
-	fPp = B/B/BBB, onychotriches present	39
39.	f ₁ posterior to S ₁ , NDV = 64, Ip < 1300	<i>Neoschoengastia apicosolenidia</i>
-	f ₁ anterior to S ₁ , NDV = 60, Ip > 1300	<i>Neoschoengastia judysouthworthi</i>
-	f ₁ at level of S ₁ , NDV = 60, Ip < 1300	<i>Neoschoengastia picata</i>
40.	Ip = 894, PW = 72, AM = 49	<i>Ornithogastia merops</i>
-	Ip = 1070, PW = 90, AM = 58	<i>Ornithogastia oenanthe</i>
41.	fSt = 2.2, f ₁ anterior to S ₁	<i>Susa kolebinovae</i>
-	fSt = 2.4(5–6), f ₁ at level or slightly posterior to S ₁	<i>Susa vorax</i>
42.	Palpal femoral and genual setae nude, 2 genualae I	43
-	At least palpal femoral seta branched	47
43.	Galeala nude, scutum trapezoidal, mastitarsalae present (genus <i>Chiroptella</i>)	<i>Chiroptella vavilovi</i>
-	Galeala branched, scutum rectangular, mastitarsalae absent	44
44.	fPp = N/N/NNN, palpal tarsus with 7 branched setae and subterminala (genus <i>Willmannium</i>)	45
-	fPp = N/N/BNN, palpal tarsus with 7 branched setae, without subterminala (genus <i>Leptotrombidium</i> , Fig. 13)	46
45.	NDV = 90–104, Ip = 966–1027	<i>Willmannium aelleni</i>
-	NDV = 83, Ip = 896–923	<i>Willmannium cavus iraniensis</i>
46.	fD = 2H-8-6-6-6-4-2	<i>Leptotrombidium silvaticum</i>
-	fD = 2H-8-8-8-6-2-2	<i>Leptotrombidium subsilvaticum</i>
47.	Palpal tarsus with 5 branched setae, PLs off scutum, parasubterminala branched or absent, eyes 1 + 1, fSt = 2.(4–7), fCx = 1.1.(4–8), f ₁ slightly posterior to S ₁ (genus <i>Otorhinophila</i> , Fig. 14)	48
-	Palpal tarsus with 6–7 branched setae and sometimes subterminala, PLs on scutum, parasubterminala nude, f ₁ anterior to S ₁	49
48.	Tibiala III present, 6 humeral setae, leg subterminala present	<i>Otorhinophila deserta</i>
-	Tibiala III absent, 4 humeral setae, leg subterminala absent	<i>Otorhinophila farhangazadi</i>
49.	Palpal tarsus with 6 branched setae, fPp = B/B/BBB, scutum as wide as long, with anterolateral shoulders, AM anterior to level of ALs (genus <i>Microtrombicula</i> , Fig. 15)	50
-	Palpal tarsus with 7 branched setae and usually subterminala, scutum wider than long	58
50.	Arrangement of dorsal idiosomal setae in first rows 6-6-6(4)	51
-	Arrangement of dorsal idiosomal setae in first rows 8-6(8)-6	54
51.	fCx = 1.2.1	<i>Microtrombicula similata</i>
-	fCx = 1.1.1	52

52.	Three genualae I	<i>Microtrombicula potamophila</i>
-	Two genualae I	53
53.	Galeala branched, eyes 2 + 2	<i>Microtrombicula azerbaijanica</i>
-	Galeala nude, eyes 1 + 1	<i>Microtrombicula meriones</i>
54.	Galeala nude, 8 setae in 2 nd row of dorsal idiosomal setae, fCx = 1.1.1, fSt = 2.2, leg subterminala and parasubterminala present	<i>Microtrombicula galerida</i>
-	Galeala branched, 6 setae in 2 nd row of dorsal idiosomal setae, fCx = 1.2.1, fSt = 2.4, leg subterminala and parasubterminala absent	55
55.	Three genualae I	<i>Microtrombicula traubi</i>
-	Two genualae I	56
56.	Eyes 1 + 1	<i>Microtrombicula media</i>
-	Eyes 2 + 2	57
57.	One genuala I situated in proximal and one in distal part of genu, f ₂ anterior to S ₂	<i>Microtrombicula subtilissima</i>
-	Two genualae I situated in distal part of genu, f ₂ slightly posterior to S ₂	<i>Microtrombicula tenera</i>
58.	Three genualae I (2 basal and 1 distal), palpal subterminala absent (genus <i>Pentidionis</i>)	<i>Pentidionis agamae</i>
-	Two distal or 1 basal and 2 distal genualae I, palpal subterminala present	59
59.	Scutum pentagonal, posterior scutal margin sharply angulate, PLs situated close to ALs (genus <i>Miyatrombicula</i>)	<i>Miyatrombicula nikitini</i>
-	Scutum rectangular, galeala branched, 2 genualae I, mastisetæ absent, fD = 2H-8-6-6-... (genus <i>Ericotrombidium</i> , Fig. 16)	60
-	Scutum hexagonal, PLs posterior to level of SB, sensilla with 1–3 branches or nude, galeala and all palpal setae branched, 2 genualae I, mastitarsala present (genus <i>Hirsutiella</i> , Fig. 17)	<i>Hirsutiella illogorensis</i>
-	Scutum subpentagonal, with rounded posterior margin and anterolateral shoulders, 1 st row of dorsal idiosomal setae double, 2 genualae I, mastitarsala present (genus <i>Kepkatrombicula</i> , Fig. 18)	64
-	Scutum subpentagonal, usually with rounded posterior margin (if posterior margin angulate, then PLs situated not close to ALs), without anterolateral shoulders, mastitarsala usually present (genus <i>Neotrombicula</i> , Fig. 19)	65
60.	AM ≥ SD	<i>Ericotrombidium jayewickremei</i>
-	AM << SD	61
61.	fPp = B/B/NNB	62
-	fPp = B/B/NbB	63
62.	Posterior scutal margin slightly concave medially, Ip = 860–901	<i>Ericotrombidium kazeruni</i>
-	Posterior scutal margin clearly bilobate, Ip = 784–843	<i>Ericotrombidium biconcavum</i>
63.	PL > 40, Ip = 871–925	<i>Ericotrombidium iranica</i>
-	PL < 40, Ip = 769–792	<i>Ericotrombidium limpidum</i>
64.	fPp = B/B/BBB, Ip ≤ 900, AM = 25–29, PL = 41	<i>Kepkatrombicula blanfordi</i>
-	fPp = B/B/NBB, Ip > 1000, AM = 40–45, PL = 62–73	<i>Kepkatrombicula horti</i>
65.	Galeala and all palpal setae branched (sometimes dorsal palpal tibial seta nude)	66
-	Galeala nude	69
66.	Two genualae I, f ₁ at level of S ₁	67
-	Three genualae I, f ₁ anterior to S ₁	68
67.	fCx = 1.1.2, mastitarsala with 2–3 cilia in basal part	<i>Neotrombicula sabzavari</i>
-	fCx = 1.1.1, mastitarsala absent	<i>Neotrombicula mofidii</i>
68.	fD = 2H-8-10-8(9)-6-6(4)-2(4), NDV = 91–92	<i>Neotrombicula kermani</i>
-	fD = 2H-8-6-6-4-6-2, 2H-6-6-6-4-4-2, NDV = 59–70	<i>Neotrombicula talmiensis</i>
69.	Two genualae I	70
-	Three genualae I	72
70.	NDV = 52, fPp = B/B/NNB	<i>Neotrombicula heterotrichia</i>
-	NDV > 70, fPp = B/B/NbB	71
71.	NDV = 71–81	<i>Neotrombicula faghihi</i>
-	NDV > 90	<i>Neotrombicula valeri</i> (part)
72.	fCx = 1.2.2	<i>Neotrombicula valenti</i>
-	fCx = 1.1.1, rarely 1.1.2	73
73.	Four humeral setae	<i>Neotrombicula vulgaris</i>
-	Two humeral setae	74
74.	Six setae in first two rows of dorsal idiosomal setae, NDV < 70	75
-	Eight or more setae in first two rows of dorsal idiosomal setae, NDV > 75	77
75.	fPp = B/B/NNB, AM > AL	<i>Neotrombicula delijani</i>
-	fPp = B/B/N(B)BB, AL > AM	76
76.	fPp = B/B/BBB, Ip > 1000	<i>Neotrombicula heptneri</i>
-	fPp = B/B/NBB, Ip < 1000	<i>Neotrombicula nivalis</i>
77.	fPp = B/B/NNB, AM ≥ PL > AL, NDV = 78, mastitarsala absent	<i>Neotrombicula rostrata</i>
-	fPp = B/B/BBB or B/B/NbB, PL > AL > AM, NDV > 90, mastitarsala present	78
78.	fPp = B/B/BBB	<i>Neotrombicula rara</i>
-	fPp = B/B/NbB	<i>Neotrombicula valeri</i> (part)

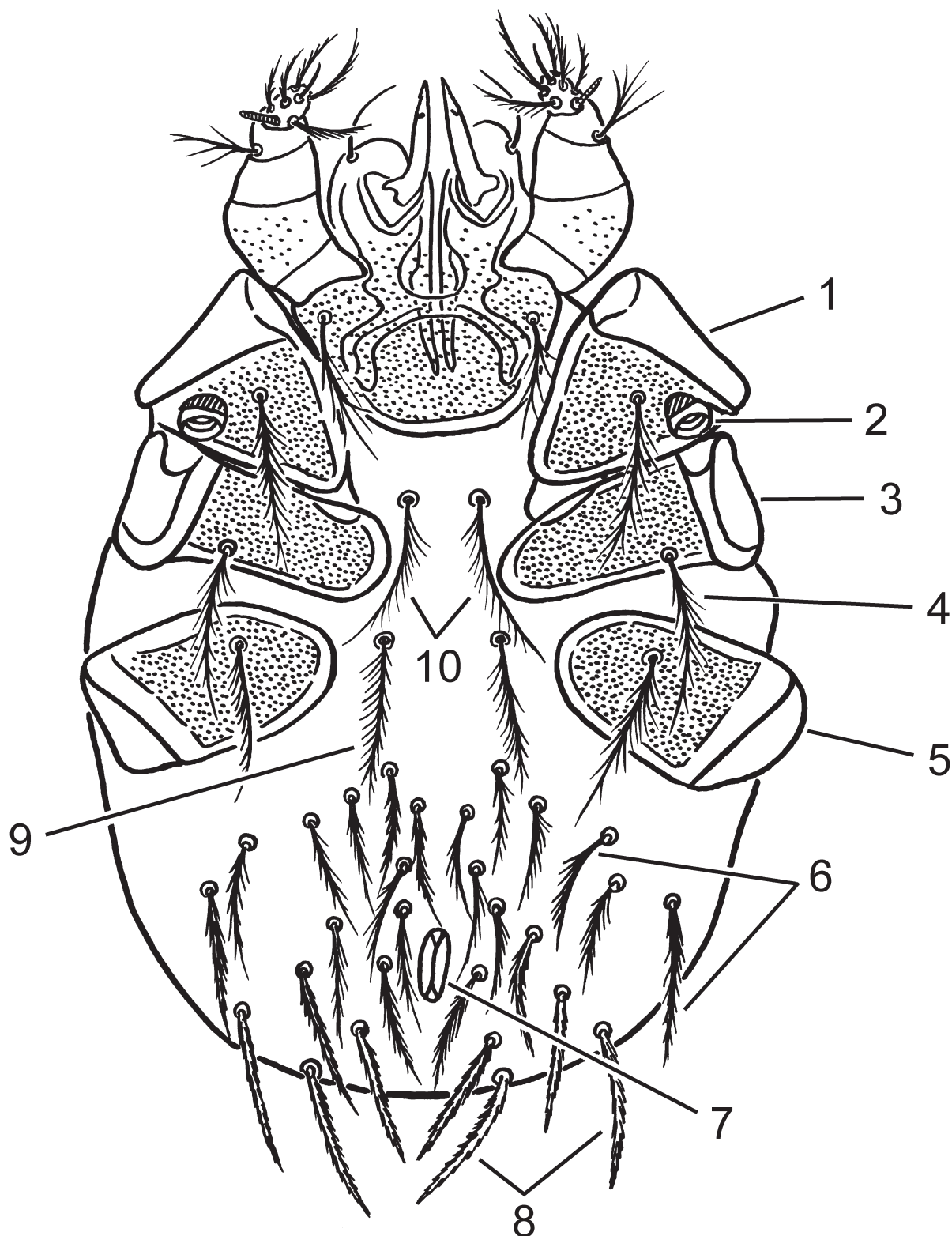


FIGURE 3. Body of trombiculid larva, ventral aspect. 1, coxa I; 2, Claparède's organ (urstigma); 3, coxa II; 4, coxal seta; 5, coxa III; 6, preanal ventral idiosomal setae; 7, excretory pore (anus); 8, postanal ventral idiosomal setae; 9, posterior sternal seta; 10, anterior sternal setae.

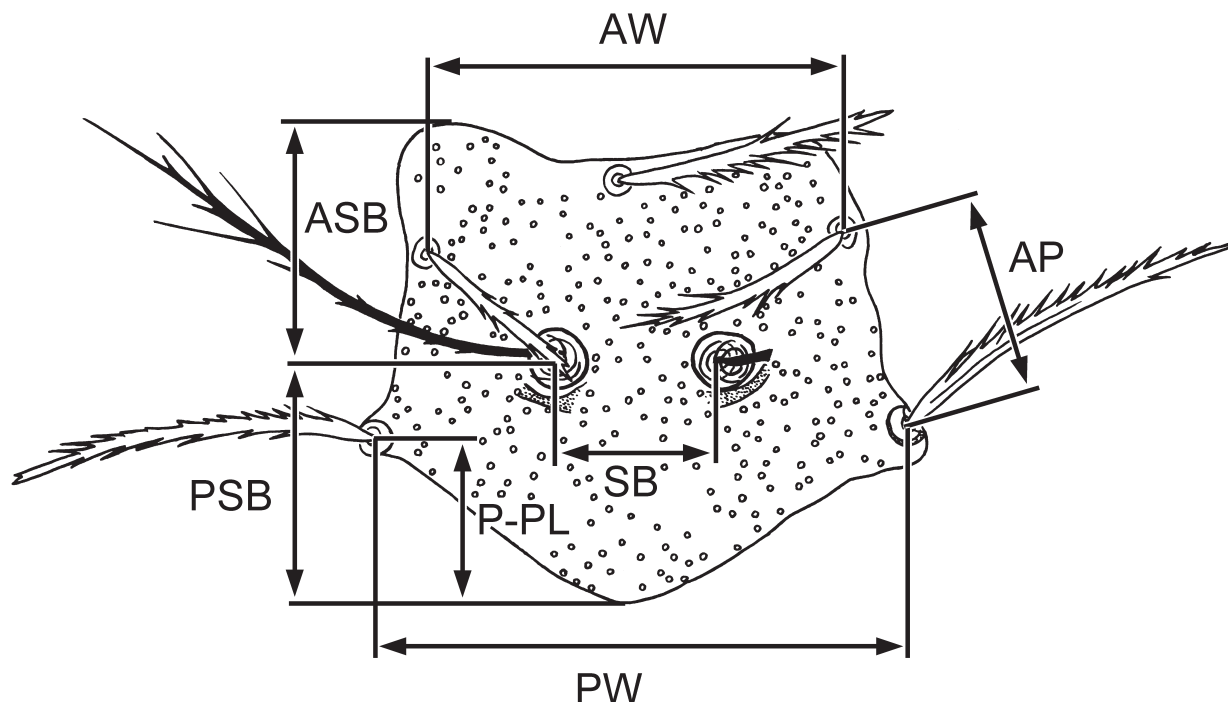


FIGURE 4. Measurements of scutum.

Systematics

Family Trombiculidae Ewing, 1944

Subfamily Apoloniinae Wharton, 1947

Womersia irani Vercammen-Grandjean, Rohde and Mesghali, 1970

Womersia irani Vercammen-Grandjean, Rohde and Mesghali, 1970: 776 (material), 784 (description), figs 20–21.

Diagnosis. SIF = 5B-N-3-1000.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2 (6.4); fSc: AM > PL ≥ AL; fD = 2H-18-12-12-10-10-12-10-14-14-14-14-12-14-12-12-10-8-6-4-2; DS = 226; VS = 266; NDV = 492; Ip = 602; eyes 2 + 2; scutum with apically tetralobate nasus, 1 AM seta and 2 AL setae; PLs off scutum; flagelliform sensilla ciliated in proximal half and branched in distal half; parasubterminala and pretarsala II absent; microgenuala I present. Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 18, SB 12, ASB 20, PSB 16, SD 36, AM 26, AL 17, PL 18, S 59, H 33, D_{min} 16, D_{max} 21, V_{min} 15, V_{max} 23, pa 218, pm 190, pp 194, Ip 602.

Type material examined. Holotype larva (IUMS) from *Neophron percnopterus*, Bandar Abbas, 20 February 1967, coll. C.J. Rohde.

Host. *Neophron percnopterus*.

Distribution. Iran (Bandar Abbas).

Remarks. Described from a single specimen.

Subfamily Gahrlepiinae Womersley, 1952

Schoengastiella irani Wen and Saboori, 2004

Schoengastiella (Dureniella) irani Wen and Saboori, 2004: 191, figs 1–2.

Diagnosis. SIF = 5B-N-3-2110.0000; fPp = N/N/NNN; fsp = 7.6.6; fCx = 1.1.2; fSt = 2.2; fSc: AL = PL > PPL; fD = 2H-6-6-6-4-2-(3); DS = 28–31; VS = 45–47; NDV = 73–78; Ip = 639–672; eyes absent; sensilla lanceolate; f_1 posterior to S_1 ; f_2 near and slightly anterior to S_2 . Measurements of holotype and paratype (Wen & Saboori 2004): AW 50, 48, PW 74, 75, SB 47, 48, ASB 20, 20, PSB 84, 93, SD 104, 113, AP 38, 48, AL 34, 38, PL 33, 38, PPL 30, 33, S 43, 41, H 43, 40, D_{\min} 24, 28, D_{\max} 35, 38, V_{\min} 17, 20, V_{\max} 27, 28, pa 218, 230, pm 198, 213, pp 223, 228, Ip 639, 672.

Type material examined. Holotype larva (Jalal Afshar Zoological Museum, Department of Plant Protection, College of Agriculture, University of Tehran, Karaj, Iran) from *Rattus* sp., Ahvaz, 20 October 1998, coll. A. Nemati.

Host. *Rattus* sp.

Distribution. Iran (Ahvaz).

***Walchia cognata* Schluger and Amanguliev, 1975**

(Fig. 5)

Walchia cognata Schluger and Amanguliev, 1975: 463, figs. 1–4.

Walchia (Walchia) cognata: Kudryashova 1998: 316, fig. 276; Stekolnikov & Daniel 2012: 94, fig. 66.

Walchia valskayae Kudryashova, 1976b: 1100, figs. 1–7; Kudryashova *et al.* 1978: 167, fig. 27.

Diagnosis. SIF = 4B-N-3-2000.0000; fPp = N/N/NNN; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fSc: AL \geq PL; fD = 2H-6-8-9(6)-6-4-4-2-2; DS = 40–50; VS = 37–51; NDV = 80–95; Ip = 542–614; cheliceral blade distally with small ventrolateral tooth and one large dorsal hook; eyes 2 + 2; f_1 at level of S_1 ; f_2 at level or slightly anterior to S_2 . Measurements of *Walchia valskayae* paratypes (Kudryashova 1998): AW 42–45, PW 53–59, SB 36–39, ASB 18–22, PSB 34–39, SD 53–59, AP 31–36, AL 22–28, PL 22–28, H 22–28, D_{\min} 17, D_{\max} 28, V_{\min} 14, V_{\max} 22, pa 190–204, pm 162–174, pp 190–207. Measurements of *Walchia valskayae* holotype: AW 50, PW 59, SB 41, ASB 20, PSB –, SD –, P-PL –, AP 32, AL 29, PL 25, H 27, D_{\min} 22, D_{\max} 25, pa 185, pm 158, pp 196, Ip 539, TaIIIL 50, TaIIW 16.

Type material examined. Holotype of *Walchia cognata*, larva (ZMMU Tdt-2360, K-6 (884)) from *Cricetulus migratorius*, Turkmenistan, Western Kopetdagh, near Kara-Kala, Ay-Dere gorge (38° 29' N, 56° 26' E), 26 September 1965, coll. A.A. Amanguliev. Holotype of *Walchia valskayae*, larva (ZMMU Tdt-719, I-314-2946) from *Meriones persicus*, Ajami, 1780 m a.s.l., 14 August 1970, coll. V.M. Neronov.

Hosts. *Apodemus sylvaticus*, *Cricetulus migratorius*, *Crocidura russula*, *Meriones persicus*, *Mus musculus*, *Microtus socialis*.

Distribution. Turkmenistan, Turkey, Iran (Ajami, Abhar, Mahdishahr, Maku, Urmia).

***Walchia irani* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Walchia (Ripiaspichia) irani Vercammen-Grandjean, Rohde and Mesghali, 1970: 776 (material), 783 (description), fig. 18.

Diagnosis. SIF = 5B-N-3-2110.0000; fPp = N/N/NNN; fsp = 7.6.6; fCx = 1.1.2; fSt = 2.2; fSc: PL > AL; fD = 2H-6-6-6-6-2-2; DS = 30; VS = 34; NDV = 64; Ip = 670; eyes absent; f_1 posterior to S_1 ; f_2 posterior to S_2 . Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 46, PW 57, SB 38, ASB 20, PSB 49, SD 69, AP 36, AL 32, PL 38, D_{\min} 27, D_{\max} 42, V_{\min} 22, V_{\max} 30, pa 230, pm 206, pp 234, Ip 670.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Tehran, 3 October 1966, coll. C.J. Rohde.

Host. *Meriones persicus*.

Distribution. Iran (Tehran).

Remarks. Described from a single specimen.

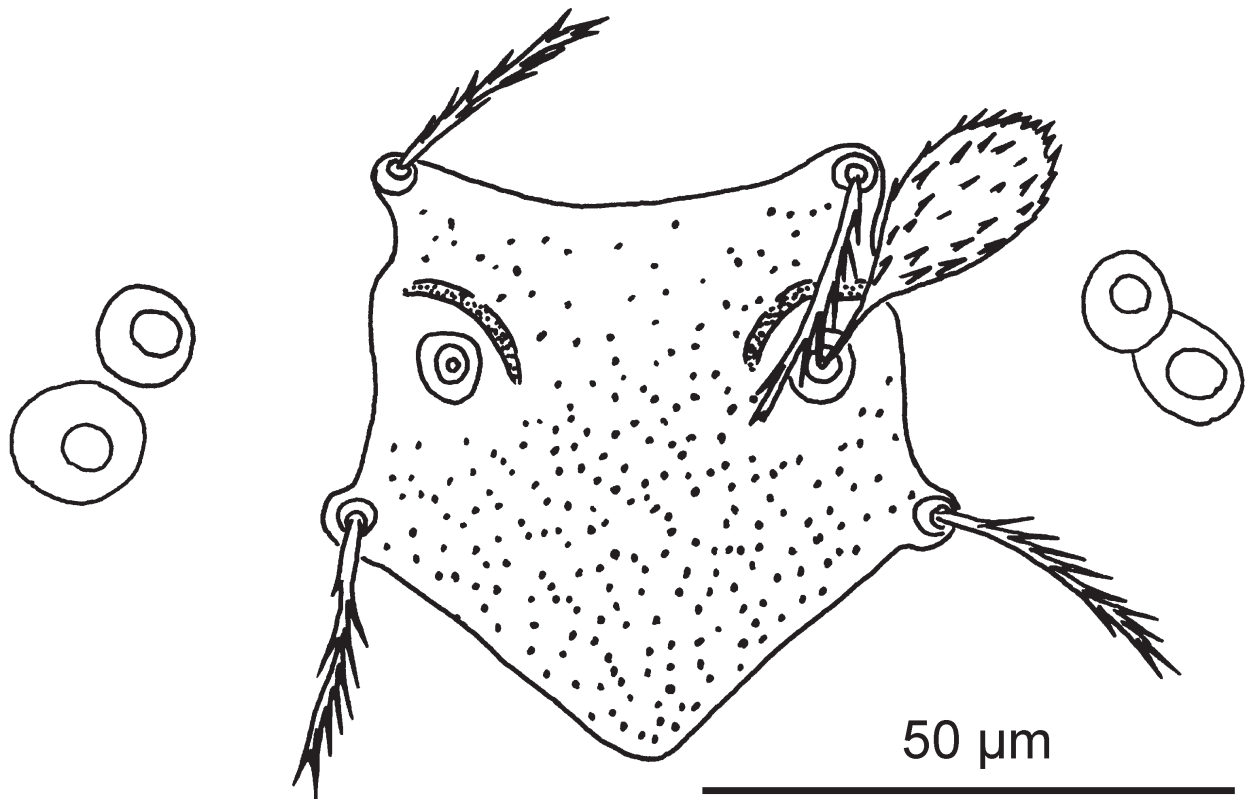


FIGURE 5. *Walchia cognata*, scutum.

Walchia montana Kudryashova, 1976

Walchia montana Kudryashova, 1976b: 1100, fig. 8; Kudryashova *et al.* 1978: 169.

Diagnosis. SIF = 4B-N-3-2000.0000; fPp = N/N/NNN; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fSc: PL \geq AL; fD = 2H-6-8-10-8-6-4; DS = 44–47; VS = 41–48; NDV = 88–92; Ip = 638–647; eyes 2 + 2; f₁ at level of S₁; f₂ at level or slightly anterior to S₂. Measurements of holotype and paratype (Kudryashova *et al.* 1978): AW 45, 45, PW 59, 59, SB 35, 39, ASB 20, 21, PSB 45, 41, SD 65, 62, AP 36, 34, AL 28, 34, PL 31, 34, S 31x14, –, H 36, 34, D_{min} 25, 28, D_{max} 34, 31, V_{min} 14, 17, V_{max} 25, 28, pa 227, 221, pm 188, 190, pp 232, 227. Measurements of holotype: AW 43, PW 57, SB 33, ASB 20, PSB 41, SD 61, P-PL 23, AP 37, AL 25, PL 27, H 34, D_{min} 23, D_{max} 26, V_{min} 14, V_{max} 22, pa 203, pm 160, pp 196, Ip 559, TaIIIL 56, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-714, I-325-3053) from *Meriones persicus*, Maku, 1000 m a.s.l., 20 August 1970, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Maku, Urmia).

Walchia schelkovnikovi Kudryashova, 1976

Walchia schelkovnikovi Kudryashova, 1976b: 1102, fig. 9; Kudryashova *et al.* 1978: 169.

Diagnosis. SIF = 4B-N-3-2000.0000; fPp = N/N/NbN; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fSc: AL \geq PL; fD = 2H-8-11-11-9-6-1-4-2; DS = 50–54; VS = 42–48; NDV = 93–102; Ip = 557–580; eyes 2 + 2; f₁ at level of S₁; f₂ at level of S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 48–53, PW 59–64, SB 39–42, ASB 20, PSB 36–

42, SD 56–62, AP 28, AL 25–28, PL 25–28, S 31x11, H 25–28, D_{\min} 20, D_{\max} 25–28, V_{\min} 14, V_{\max} 22, pa 193–204, pm 168–174, pp 193–202. Measurements of holotype: AW 49, PW 59, SB 38, ASB 18, PSB 42, SD 60, P-PL 31, AP 28, AL 24, PL 25, H 25, D_{\min} 26, D_{\max} 34, pa 193, pm 153, pp 189, Ip 535, TaIIIL 48, TaIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-716, I-327-2821) from *Meriones persicus*, Abhar, 1750 m a.s.l., 8 August 1970, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Abhar).

Subfamily Leeuwenhoeekiinae Womersley, 1944

Multisetosa persicus (Vercammen-Grandjean, Rohde and Mesghali, 1970)

(Fig. 6)

Sasacarus (Multisetosa) persicus Vercammen-Grandjean, Rohde and Mesghali, 1970: 776 (material), 783 (description), fig. 19; Kudryashova *et al.* 1976: 62, fig. 5.

Multisetosa persicus: Kudryashova 1990: 60.

Diagnosis. SIF = 7B-B-3-2111.0000; fPp = B/B/BBB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fSc: AM > PL > AL; fD = 6H-26-24-18-14-14-12-12-12-10-8-6-4-2; DS = 156; VS = 76; NDV = 244; about 5 PPL and 5 scuto-ocular setae; Ip = 840–874; cheliceral blade with 3 dorsal and 6 ventral teeth; eyes 2 + 2; tracheae and stigmata present; scutum with nasus; flagelliform sensilla with small cilia in proximal half and branches in distal half; parasubterminala branched; f_1 anterior to S_1 ; f_2 near S_2 ; onychotriches present. Measurements of 4 type specimens (Vercammen-Grandjean *et al.* 1970): AW 60–66, PW 68–76, SB 24–25, ASB 30–33, PSB 20–22, SD 52–54, AP 9–12, AM 44–47, AL 30–34, PL 36–39, S 94–102, H 41–44, D_{\min} 35–41, D_{\max} 48–50, V_{\min} 31–35, V_{\max} 45–46, pa 290–303, pm 256–268, pp 294–307, Ip 840–874, AA 7, NL 16, NW 7.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Tehran, 3 October 1966, coll. C.J. Rohde.

Hosts. *Spermophilus fulvus*, *Cricetulus migratorius*, *Meriones persicus*.

Distribution. Iran (Abhar, Delijan, Kerman, Maku, Mashhad, Tehran).

Odontacarus apricus Kudryashova, 1976

Odontacarus apricus Kudryashova, 1976 in: Kudryashova *et al.* 1976: 55, figs. 1, 3 (1–3); Kudryashova 1994: 37, fig. 13; 1998: 51, fig. 18.

Diagnosis. SIF = 7B-B-3-1001.1100; fPp = B/B/BBB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fSc: AM \geq PL > AL; fD = 2H-9(10)-11(12)-11(12)-13-13(14)-10-4-2-2; DS = 75–95; VS = 66–77; 8–12 humeroventral setae between coxae I and II; NDV = 141–161; Ip = 1016–1087; eyes 2 + 2; tracheae and stigmata present; scutum with nasus; cheliceral blade with rows of dorsal and ventral teeth; onychotriches present; parasubterminala branched; f_1 at level or posterior to S_1 ; f_2 anterior to S_2 . Measurements of type series (Kudryashova 1998): AW 60–67, PW 78–87, SB 27–31, ASB 32–36, PSB 24–28, SD 56–62, AP 28–31, AM 39–48, AL 34–36, PL 39–42, S 76–87, H 48–56, D_{\min} 28, D_{\max} 48, V_{\min} 28, V_{\max} 42, pa 347–384, pm 308–322, pp 358–384, AA 10–11. Measurements of holotype: AW 62, PW 79, SB 31, ASB 32, PSB 27, SD 59, P-PL 22, AP 31, AM 45, AL 32, PL 39, H 50, D_{\min} 28, D_{\max} 43, V_{\min} 25, V_{\max} 40, pa 376, pm 308, pp 365, Ip 1049, TaIIIL 95, TaIIW 20.

Type material examined. Holotype larva (ZMMU Tdt-430, I-440-4489-90) from *Meriones persicus*, Kerman, 2220 m a.s.l., 7 December 1970, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Kerman).

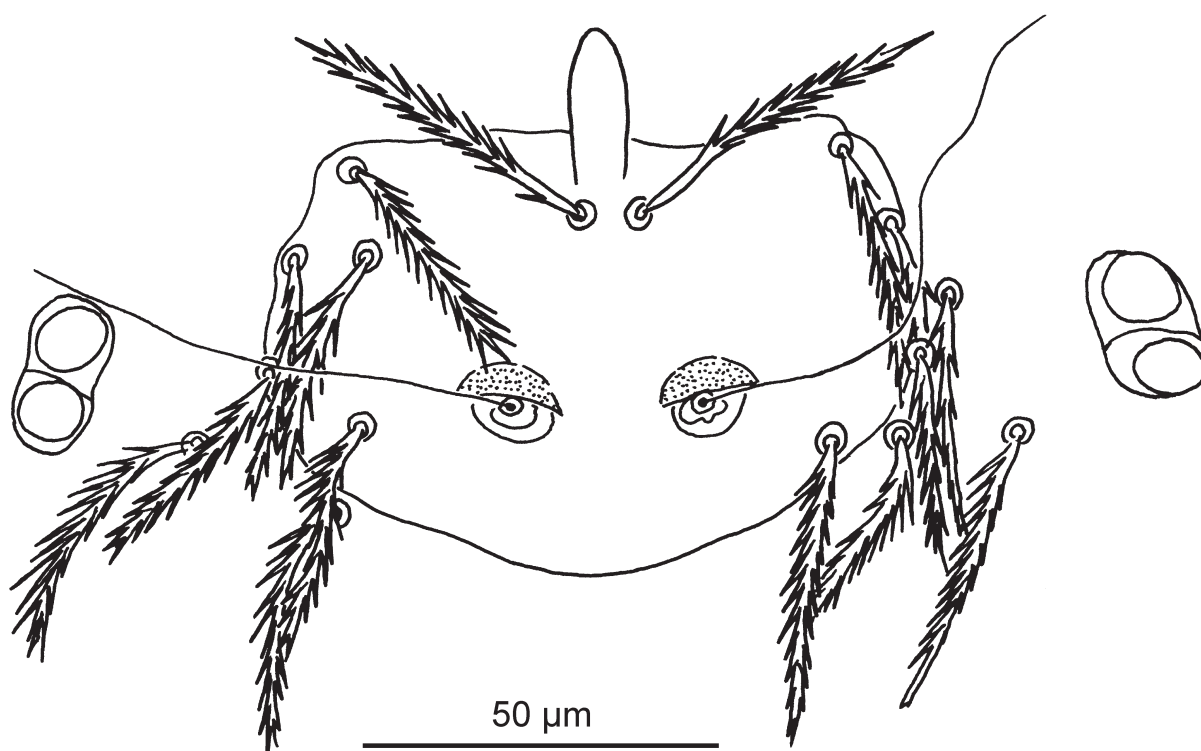


FIGURE 6. *Multisetosa persicus*, scutum.

Odontacarus dignus Kudryashova, 1976

Odontacarus dignus Kudryashova, 1976 in: Kudryashova *et al.* 1976: 57, figs. 2, 3 (4–6); Kudryashova 1994: 34, fig. 12; 1998: 52, fig. 19.

Diagnosis. SIF = 7B-B-3-1001.1100; fPp = B/B/BBB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fSc: AM \geq AL > PL; fD = 2H-[12-10-8]-14-2-14-14-10-9-6-11; DS = 108–128; VS = 80–96; 12–15 humeroventral setae between coxae I and II; NDV = 191–220; Ip = 1145–1184; eyes 2 + 2; tracheae and stigmata present; scutum with nasus; cheliceral blade with rows of dorsal and ventral teeth; onychotriches present; parasubterminala branched; f₁ slightly anterior to S₁; f₂ at level or slightly posterior to S₂. Measurements of type series (Kudryashova 1998): AW 62–70, PW 78–84, SB 25–28, ASB 34–38, PSB 25–28, SD 62–64, AP 28–34, AM 50–56, AL 45–50, PL 36–45, S 98, H 42–62, D_{min} 28, D_{max} 50, V_{min} 22, V_{max} 45, pa 384–406, pm 342–358, pp 412–423, AA 10–11. Measurements of holotype: AW 65, PW 79, SB 25, ASB 39, PSB 31, SD 70, P-PL 27, AP 27, AM 53, AL 45, PL 38, H 57, D_{min} 27, D_{max} 49, V_{min} 24, V_{max} 38, pa 407, pm 346, pp 412, Ip 1165, TaIIIL 119, TaIIIW 23, NL 22, NW 9, AA 12.

Type material examined. Holotype larva (ZMMU Tdt-445, I-451-1777) from *Meriones persicus*, Delijan, 1600 m a.s.l., 14 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Delijan, Zarrin Shahr).

Odontacarus efferus Kudryashova, 1976

(Fig. 7)

Odontacarus efferus Kudryashova, 1976 in: Kudryashova *et al.* 1976: 60, fig. 4; Kudryashova 1994: 16, fig. 5; 1998: 44, fig. 11.

Diagnosis. SIF = 7B-B-2-2111.0000; fPp = B/B/BBB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fSc: PL > AM > AL; fD = 2H-(8-12)-(10-13)-(10-14)-(12-15)-(10-14)-(8-11)-6(8)-4(2)-4-(3-5); DS = 74-85; VS = 54-64; NDV = 128-141; Ip = 812-882; eyes 2 + 2; tracheae and stigmata present; scutum with nasus; cheliceral blade with rows of dorsal and ventral teeth; parasubterminala branched; f_1 anterior to S_1 ; f_2 at level of S_2 . Measurements of type series (Kudryashova *et al.* 1976): AW 70-76, PW 87-92, SB 34-36, ASB 28-36, PSB 20-22, SD 50-59, AP 22-25, AM 42-48, AL 34-39, PL 50-56, S 84-90, H 56-59, D_{\min} 28, D_{\max} 45, V_{\min} 20, V_{\max} 42, pa 277-302, pm 249-274, pp 286-308, AA 11. Measurements of holotype: AW 74, PW 87, SB 34, ASB 29, PSB 20, SD 49, P-PL 25, AP 22, AM 45, AL 34, PL 54, H 52, D_{\min} 27, D_{\max} 43, V_{\min} 23, V_{\max} 34, pa 292, pm 245, pp 275, Ip 812, TaIII 72, TaIIW 20, NL 13, NW 7, AA 13.

Type material examined. Holotype larva (ZMMU Tdt-289, I-462-3318) from *Nesokia indica*, Shushtar, 250 m a.s.l., 9 September 1970, coll. V.M. Neronov.

Hosts. *Nesokia indica*, *Tatera indica*.

Distribution. Iran (Chahar Taq, Shushtar).

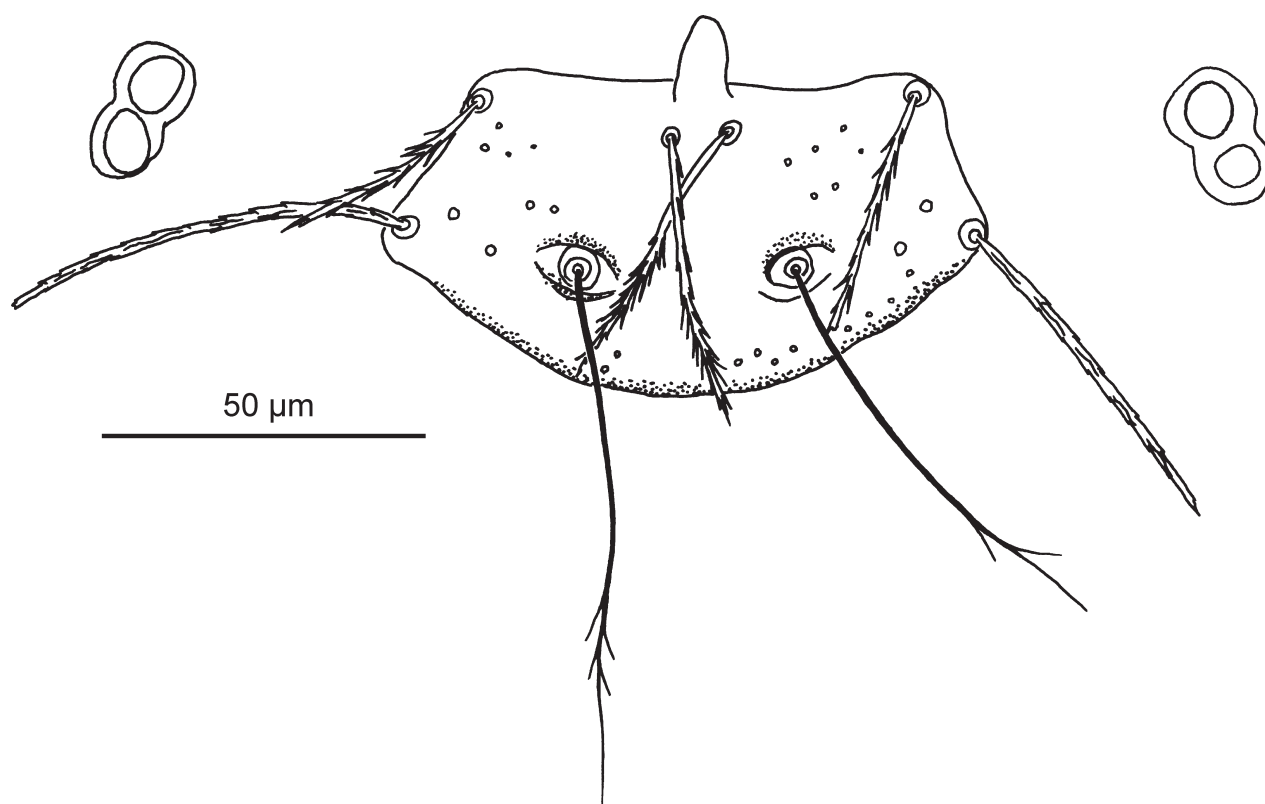


FIGURE 7. *Odontacarus efferus*, scutum.

Odontacarus khanjanii Goff and Saboori, 1998

Odontacarus khanjanii Goff and Saboori, 1998: 857, fig. 1.

Diagnosis. SIF = 7B-B-4-2001.1000; fPp = B/B/BNB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fSc: AM ≥ AL > PL; fD = 4H-12-10-8-16; DS = 50; VS = 26; 6 humeroventral setae between coxae I and II; NDV = 82; Ip = 792; eyes 2 + 2; tracheae and stigmata present; scutum with nasus; cheliceral blade with row of 7 dorsal teeth; onychotriches present; parasubterminala branched; f_1 posterior to S_1 ; f_2 at level of S_2 . Measurements of holotype (Goff & Saboori 1998): AA 7, AW 50, PW 65, SB 25, ASB 24, PSB 17, AP 19, AM 27, AL 27, PL 35, S 62, H 34-40, D_{\min} 23, D_{\max} 27, V_{\min} 17, V_{\max} 28, pa 280, pm 248, pp 264.

Type data. Holotype larva (USNM), collected free on *Medicago sativa*, Asadabad, 1800 m a.s.l., 15 July 1992, coll. M. Khanjani.

Host. Unknown.

Distribution. Iran (Asadabad).

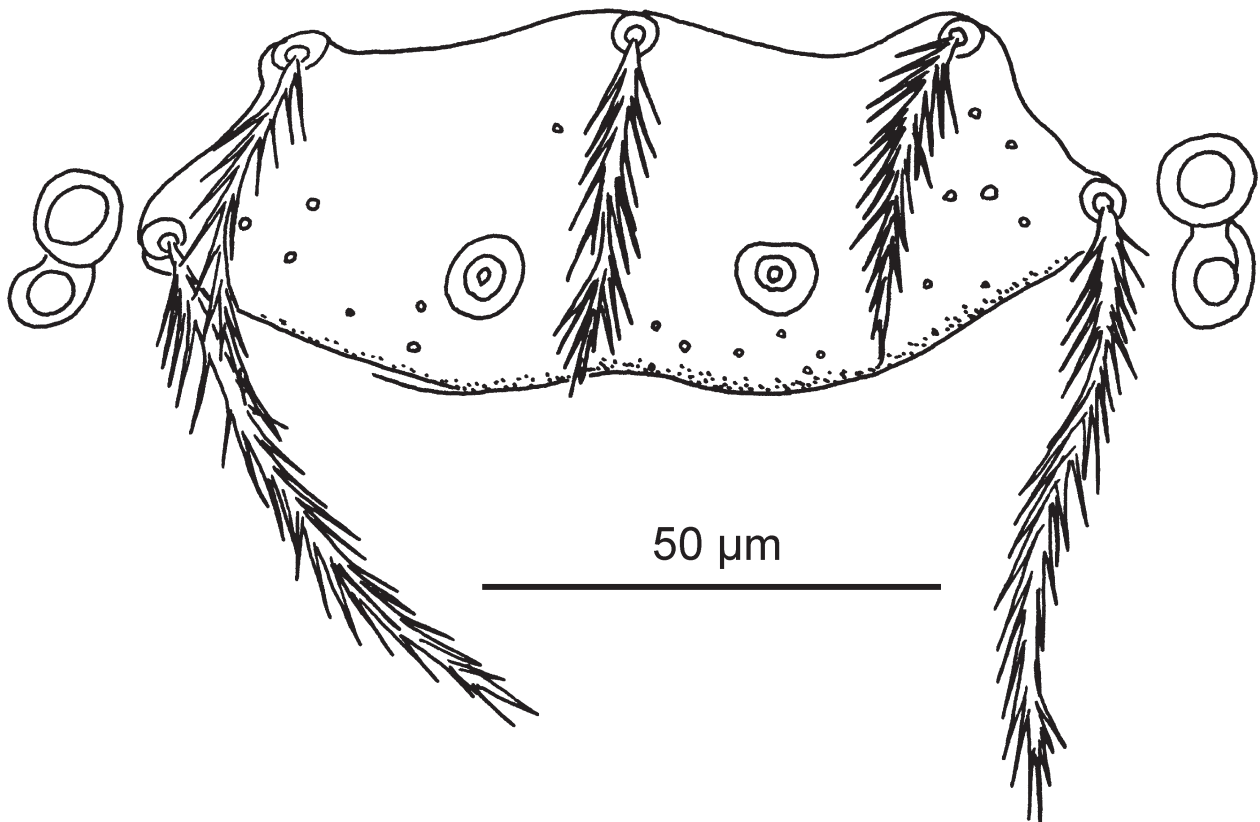


FIGURE 8. *Euschoengastia meshhedensis*, scutum (sensilla lost).

Subfamily Trombiculinae Ewing, 1929

Tribe Schoengastiini Vercammen-Grandjean, 1960

Brunehaldia iranica (Kudryashova, Neronov and Farang-Azad, 1978)

Euschoengastia (*Brunehaldia*) *iranica* Kudryashova, Neronov and Farang-Azad, 1978: 142, figs. 17 (2–5), 18 (7–8).

Brunehaldia iranica: Kudryashova 1998: 292, fig. 252; Stekolnikov & Daniel 2012: 77.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; DS = 89–106; VS = 60–83; NDV = 152–176; Ip = 767–835; eyes absent; pST with 1–2 branches; f_1 anterior to S_1 ; f_2 near or slightly posterior to S_2 . Measurements of type series (Kudryashova 1998): AW 62–70, PW 70–81, SB 25–28, ASB 25–31, PSB 14–20, SD 42–48, AP 14, AM 31–34, AL 42–48, PL 56–67, D_{\min} 34–39, D_{\max} 45–53, V_{\min} 20–28, V_{\max} 36–42, pa 263–288, pm 238–255, pp 266–297. Measurements of holotype: AW 65, PW 71, SB 23, ASB 30, PSB 18, SD 48, P-PL 30, AP 15, AM 31, AL 36, PL 52, H 41, D_{\min} 32, D_{\max} 41, V_{\min} 22, V_{\max} 37, pa 254, pm 230, pp 254, Ip 738, TaIIIL 61, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-613, I-296-3044) from *Meriones persicus*, Maku, 1000 m a.s.l., 20 August 1970, coll. V.M. Neronov.

Hosts. *Allactaga williamsi*, *Apodemus agrarius*, *Apodemus sylvaticus*, *Cricetulus migratorius*, *Meriones persicus*.

Distribution. Iran (Abhar, Delijan, Maku), Russia (south of Stavropolsky Krai, North Ossetia).

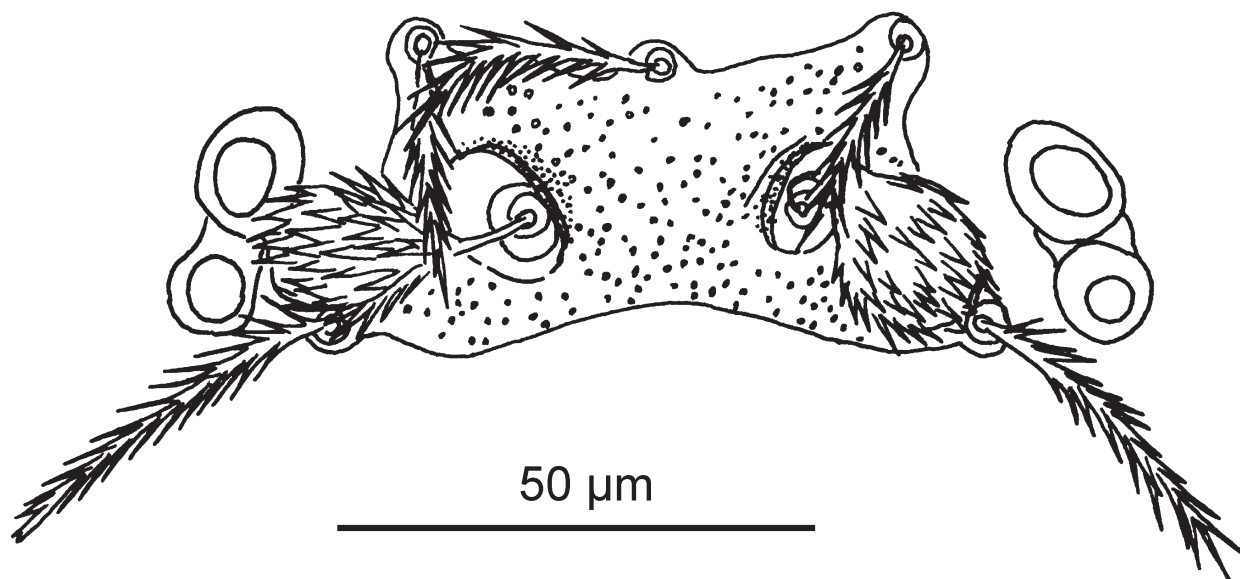


FIGURE 9. *Schoutedenichia anatolica*, scutum.

***Brunehaldia schmuteri* (Schluger, 1966)**

Euschoengastia (*Brunehaldia*) *schmuteri* Schluger, 1966: 212, fig. 4.

Brunehaldia schmuteri, Kudryashova 1998: 295, fig. 255.

Euschoengastia (*Brunehaldia*) *zahedanica* Kudryashova *et al.*, 1978: 146, figs. 17 (1), 18 (5, 6), 19 (4–6).

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3(4); fSt = 2.2; fSc: PL > AL > AM; DS = 100–115; VS = 70–92; NDV = 179–205; Ip = 807–898; eyes absent; pST nude; f₁ anterior to S₁; f₂ near S₂. Measurements of two paratypes of *Euschoengastia* (*Brunehaldia*) *zahedanica*: AW 71, 69, PW 77, 78, SB 20, 29, ASB 32, 27, PSB 20, 18, SD 52, 45, P-PL 32, 30, AP 16, 14, AM 35, 28, AL 43, 37, PL 62, 57, H 46, 45, D_{min} 34, 33, D_{max} 47, 43, V_{min} 25, 23, V_{max} 43, 38, pa 261, 247, pm 236, 221, pp 274, 256, Ip 771, 724, TaIII 72, 63, TaIIW 17, 20.

Type material examined. Holotype of *Euschoengastia* (*Brunehaldia*) *zahedanica* larva (ZMMU Tdt-634, I-293-4149; crystallized, not suitable for measuring) from *Meriones libycus*, Zahedan, 1525 m a.s.l., 6 November 1970, coll. V.M. Neronov; two paratype larvae (ZMMU Tdt-636, I-295-4149; Tdt-635, I-294-4149) with the same data as holotype.

Hosts. *Cricetulus migratorius*, *Meriones libycus*, *M. meridianus*, *M. tamariscinus*, *Rhombomys opimus*.

Distribution. Uzbekistan, Turkmenistan, Kazakhstan, Azerbaijan, Russia (Samara Region), Iran (Zahedan).

***Brunehaldia silvatica* (Kudryashova, Neronov and Farang-Azad, 1978)**

(Fig. 11)

Euschoengastia (*Brunehaldia*) *silvatica* Kudryashova, Neronov and Farang-Azad, 1978: 145, figs. 18 (1–4), 19 (1–3).

Brunehaldia silvatica: Kudryashova 1998: 294, fig. 254.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; DS = 108–129; VS = 80–104; NDV = 196–225; Ip = 851–914; eyes absent; pST with 1 branch; f₁ anterior to S₁; f₂ slightly anterior to S₂. Measurements of type series (Kudryashova 1998): AW 70–81, PW 81–90, SB 31–34, ASB 31–33, PSB 15–19, SD 48–50, AP 14–17, AM 39–42, AL 42–50, PL 56–62, D_{min} 36, D_{max} 59, V_{min} 22, V_{max} 42, pa 291–314, pm 263–286, pp 288–314. Measurements of holotype: AW 77, PW 86, SB 36, ASB 30, PSB 20, SD 50,

P-PL 32, AP 17, AM 38, AL 45, PL 58, H 53, D_{\min} 43, D_{\max} 58, V_{\min} 25, V_{\max} 43, pa 292, pm 268, pp 290, Ip 850, TaIIIL 74, TaIIIW 20.

Type material examined. Holotype larva (ZMMU Tdt-645, I-282-3850) from *Apodemus sylvaticus*, Mashhad 2, 1100 m a.s.l., 15 October 1970, coll. V.M. Neronov.

Host. *Apodemus sylvaticus*.

Distribution. Iran (Mashhad 2).

***Cheladonta brevipalpis ghazvini* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Cheladonta brevipalpis ghazvini Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 782 (description), fig. 15.

Diagnosis. SIF = 4B-N-6-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-10-8-8-2-6-2-2; DS = 42; VS = 34; NDV = 76; Ip = 645; eyes 1 + 1; f_1 posterior to S_1 ; f_2 near S_2 . Measurements of 13 type specimens (Vercammen-Grandjean *et al.* 1970): AW 46–53, PW 59–65, SB 18–20, ASB 20–23, PSB 13–15, SD 33–38, AP 22–26, AM 26–28, AL 21–24, PL 37–41, H 39–42, D_{\min} 29–33, D_{\max} 36–42, V_{\min} 22–26, V_{\max} 33–36, pa 230–248, pm 186–194, pp 202–216, Ip 625–654.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Qazvin, 1 May 1967, coll. C.J. Rohde.

Hosts. *Meriones persicus*, *Rhombomys opimus*.

Distribution. Iran (Qazvin, Isfahan).

***Cheladonta firdousii* Kudryashova, Neronov and Farang-Azad, 1978**

(Fig. 10)

Cheladonta (Cheladonta) firdousii Kudryashova, Neronov and Farang-Azad, 1978: 154, fig. 22.

Diagnosis. SIF = 4B-N-3-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-10-8-9-2-4-4; DS = 41; VS = 35; NDV = 76; Ip = 734; eyes 1 + 1; f_1 posterior to S_1 ; f_2 near S_2 . Measurements of holotype: AW 60, PW 70, SB 23, ASB 23, PSB 21, SD 44, P-PL 14, AP 29, AM 24, AL 18, PL 35, H 36, D_{\min} 29, D_{\max} 38, V_{\min} 20, V_{\max} 35, pa 252, pm 200, pp 232, Ip 684, TaIIIL 63, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-268, I-16-1809) from *Meriones persicus*, Delijan, 1600 m a.s.l., stony slopes of mountains, 14 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Delijan).

Remarks. Described from a single specimen.

***Cheladonta iraniensis* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Cheladonta iraniensis Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 782 (description), fig. 16.

Diagnosis. SIF = 4B-B-7-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-10-8-8-2-4-4; DS = 40; VS = 34; NDV = 74; Ip = 644; eyes 1 + 1; f_1 at level of S_1 ; f_2 at level of S_2 . Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 52, PW 72, SB 22, ASB 21, PSB 14, SD 35, AP 21, AM 29, AL 26, PL 43, H 46, D_{\min} 36, D_{\max} 38, V_{\min} 20, V_{\max} 40, pa 228, pm 192, pp 222, Ip 642.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Qazvin, 3 October 1966, coll. C.J. Rohde.

Host. *Meriones persicus*.

Distribution. Iran (Qazvin).

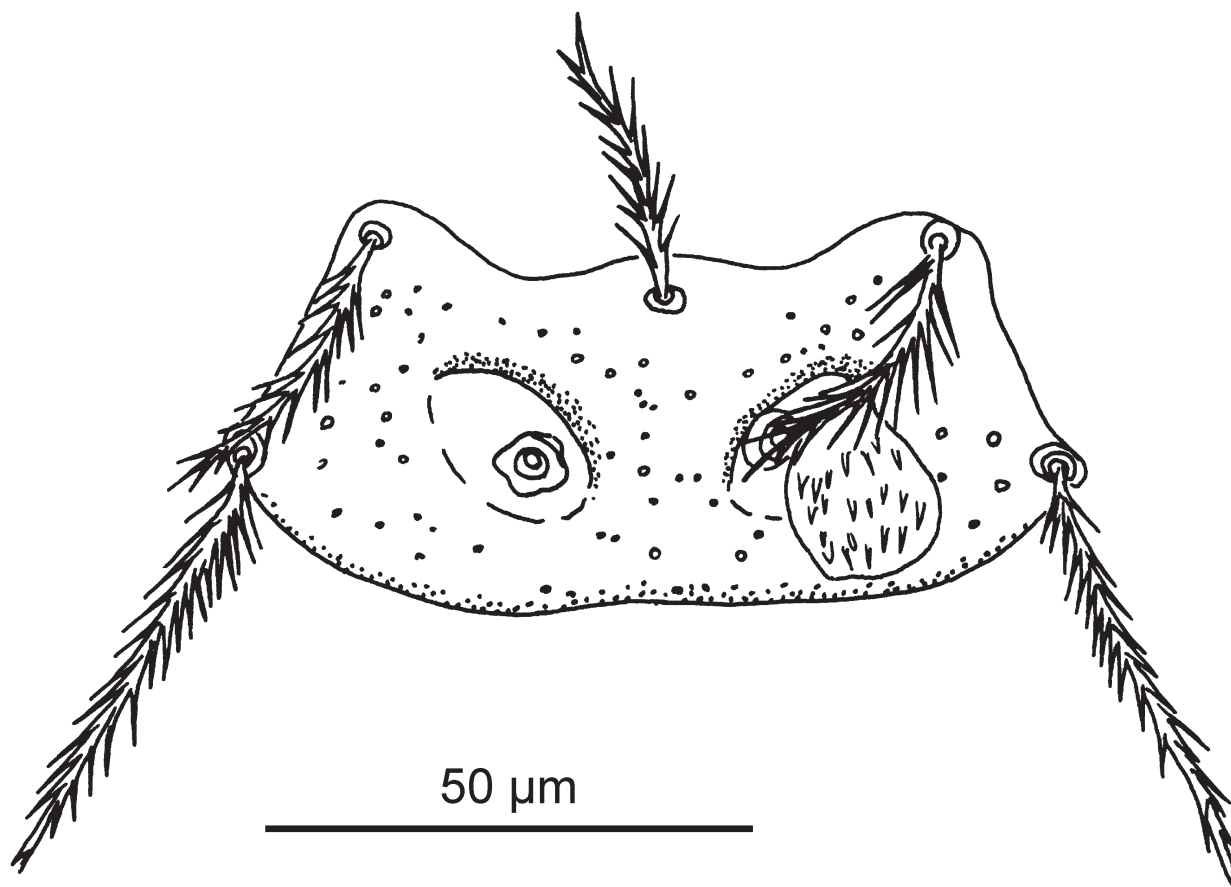


FIGURE 10. *Cheladonta firdousii*, scutum.

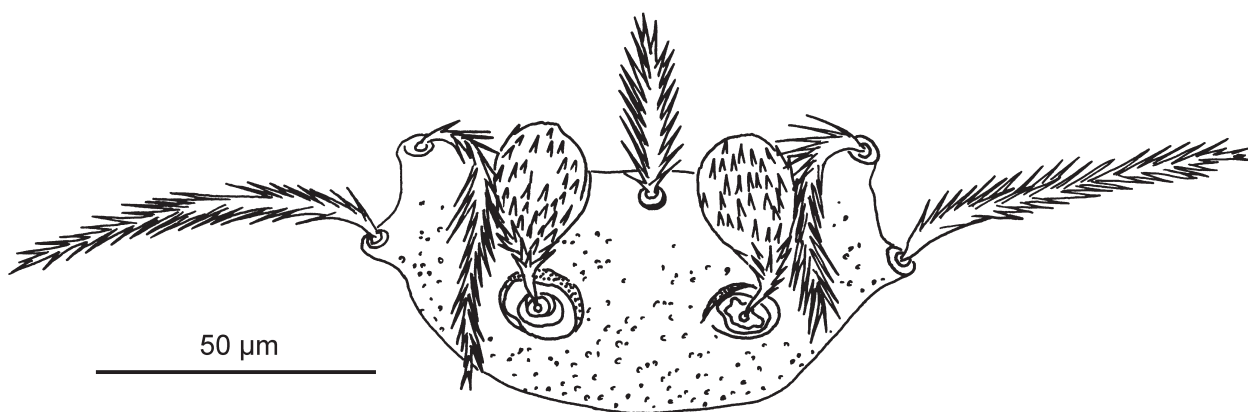


FIGURE 11. *Brunehaldia silvatica*, scutum.

***Cheladonta serrata* Kudryashova, Neronov and Farang-Azad, 1978**

Cheladonta (Susa) serrata Kudryashova, Neronov and Farang-Azad, 1978: 156, fig. 23.

Diagnosis. SIF = 4B-B-3-2000.0000; fPp = B/B/bbB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-6-4-8-6-8-4-7-2-8-3-4-6; DS = 58–74; VS = 50–62; NDV = 112–131; Ip = 663–698; eyes 2 + 2; f₁ anterior to S₁; f₂ anterior to S₂; S₂ > S₁. Measurements of type series (Kudryashova *et al.* 1978): AW 42–46, PW 56–64, SB

17–21, ASB 17–20, PSB 14–18, SD 34–37, AP 28–31, AM 22–28, AL 20–22, PL 34–36, H 31–36, D_{\min} 17, D_{\max} 34, V_{\min} 14, V_{\max} 28, pa 246–260, pm 190–207, pp 221–238. Measurements of holotype: AW 42, PW 61, SB 18, ASB 18, PSB 16, SD 34, P-PL 5, AP 30, AM 25, AL 20, PL 32, S 30, H 31, D_{\min} 19, D_{\max} 30, V_{\min} 17, V_{\max} 26, pa 232, pm 187, pp 212, Ip 631, TaIIIL 58, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-251, I-13-2446) from *Meriones persicus*, Chahar Taq, 1130 m a.s.l., stony slopes of mountains and thickets of tamarisk along the river, 27 November 1969, coll. V.M. Neronov.

Hosts. *Meriones persicus* and *Nesokia indica*.

Distribution. Iran (Chahar Taq, Kerman, Zahedan).

Doloisia iranensis Goff, 1983

Doloisia iranensis Goff, 1983: 670, fig. 1.

Diagnosis. SIF = 4B-N-3-2110.3200; fPp = B/B/NN(f)B; fsp = 7.7.7; fCx = 1.3.10; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-6-4-10-6-6-2-2; DS = 40; VS = 34; NDV = 74; Ip = 572; cheliceral blade with accessory dorsal subapical tooth; eyes 1 + 1; PLs extrascutal, ALs spiniform, nude; sensilla capitate; f_1 anterior to S_1 ; f_2 posterior to S_2 . Measurements of holotype (Goff 1983): AW 15, SB 22, ASB 19, PSB 12, SD 31, AM 29, AL 16, PL 33, H 33–52, D_{\min} 21, D_{\max} 27, V_{\min} 21, V_{\max} 28, pa 192, pm 169, pp 211, Ip 572, TaIIIL 53, TaIIIW 14.

Type data. Holotype larva (USNM) from *Cricetulus migratorius*, Khorramabad, 1 May 1964, coll. R.G. Tuck.

Host. *Cricetulus migratorius*.

Distribution. Iran (Khorramabad).

Remarks. Described from a single specimen.

Euschoengastia meshhedensis Kudryashova, Neronov and Farang-Azad, 1978

(Fig. 8)

Euschoengastia (*Euschoengastia*) *meshhedensis* Kudryashova, Neronov and Farang-Azad, 1978: 140, fig. 16.

Euschoengastia meshhedensis: Daniel *et al.*, 2010: 1229, fig. 12.

Diagnosis. SIF = 7B-B-7-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-12-13-10-4-4-3; DS = 48–59; VS = 44–52; NDV = 92–104; Ip = 868–898; eyes 2 + 2; f_1 anterior to S_1 ; f_2 near S_2 ; $S_2 > S_1$. Measurements of type series (Kudryashova *et al.* 1978): AW 64–76, PW 98–109, SB 34–38, ASB 28–31, PSB 11, SD 39–42, AP 20–22, AM 31–34, AL 31–34, PL 64–70, S 39–42x14, H 76–84, D_{\min} 42, D_{\max} 73, V_{\min} 31, V_{\max} 62, pa 300–308, pm 266–274, pp 300–316. Measurements of holotype: AW 73, PW 101, SB 34, ASB 26, PSB 12, SD 38, P-PL 22, AP 20, AM 32, AL 32, PL 67, H 76, D_{\min} 53, D_{\max} 72, V_{\min} 36, V_{\max} 61, pa 288, pm 261, pp 295, Ip 844, TaIIIL 77, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-637, I-307-3891-92) from *Meriones persicus*, Mashhad 2, 1100 m a.s.l., 15 October 1970, coll. V.M. Neronov.

Hosts. *Apodemus* sp., *Mus musculus*, *Meriones persicus*, *Alticola roylei*, *Cricetulus migratorius*.

Distribution. Iran (Mashhad), Afghanistan.

Helenicula amicula Nadchatram and Traub, 1971

(Fig. 12)

Helenicula amicula Nadchatram and Traub, 1971: 587, figs. 86–93; Kudryashova *et al.* 1978: 161.

Diagnosis. SIF = 5B-N-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.2; fSt = 2.2; fSc: AL > PL > AM; DS = 67–74; VS = 50–62; NDV = 121–136; 14–19 ventrohumeral setae between coxae II and III; Ip = 921–982; eyes

2 + 2; S_1 apical, at level of ST; f_1 posterior to S_1 ; tibialae I apical; f_2 anterior to S_2 . Measurements of 10 type specimens (Nadchatram & Traub 1971): AW 54–62, PW 74–80, SB 10–13, ASB 30–31, PSB 19–22, SD 49–53, AP 34–38, AM 37–45, AL 60–70, PL 50–58, S 34, H 40–45, D_{\min} 28, D_{\max} 55, V_{\min} 25, V_{\max} 42, pa 300–330, pm 260, pp 305–325, Ip 865–910, TaIIIL 78–86, TaIIIW 15–18.

Type data. Holotype larva (USNM 9498, B 72289-5) from *Hystrix* sp., Sar Bisheh, 11 November 1964, coll. R.G. Tuck.

Hosts. *Hystrix* sp., *Meriones* sp., *Calomyscus* sp.

Distribution. Iran (Delijan, Masjed Soleyman, Sar Bisheh).

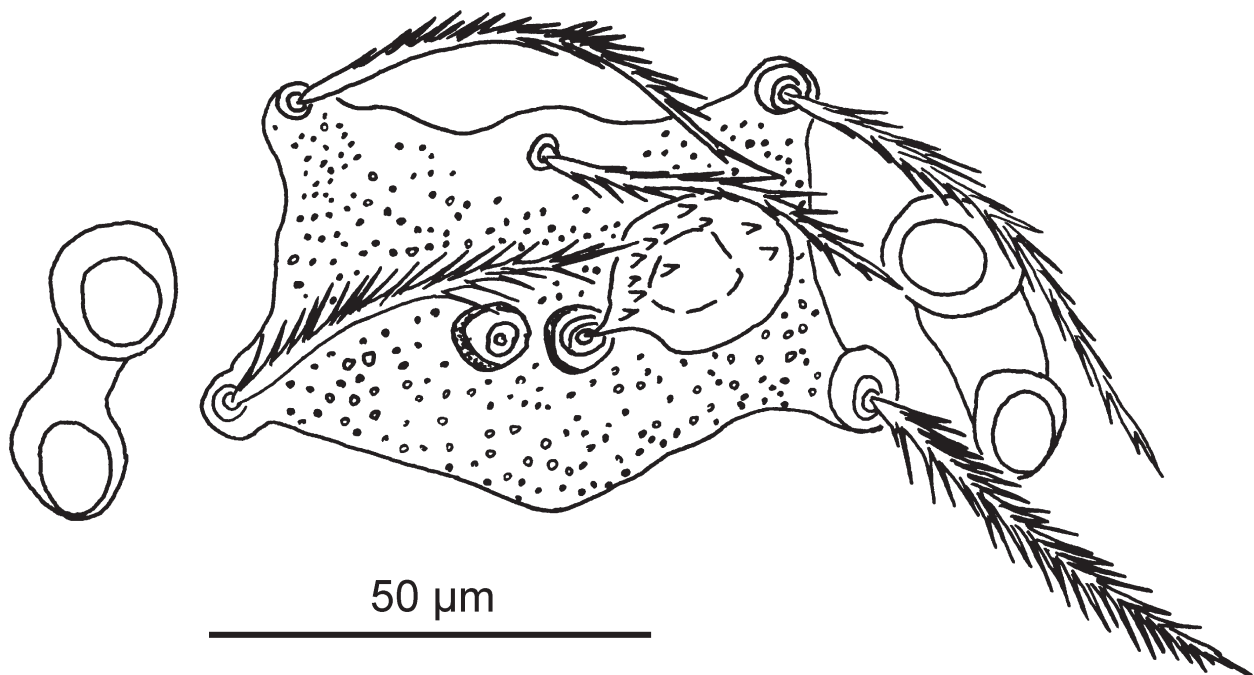


FIGURE 12. *Hellenicula amicola*, scutum.

Hellenicula goodorziani Kudryashova, 1973

Hellenicula goodorziani Kudryashova, 1973 in: Kudryashova *et al.* 1973b: 1725, fig.; Kudryashova *et al.* 1978: 158; Kudryashova 1998: 276.

Diagnosis. SIF = 5B-B-3-1111.0000; fPp = B/B/BNB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.4; fSc: AL > PL > AM; fD = 4H-8-8-4-8-4-4-6-6-8-4-12-6; DS = 72–95; VS = 55–71; NDV = 134–163; Ip = 793–862; eyes 2 + 2; S_1 apical, at level of ST; f_1 posterior to S_1 ; tibialae I apical; f_2 anterior to S_2 ; S_2 > S_1 . Measurements of type series (Kudryashova *et al.* 1978): AW 56–61, PW 69–78, SB 8–11, ASB 28–31, PSB 14–17, SD 42–45, AP 19–25, AM 30–36, AL 42–50, PL 39–45, S 25, H 36–45, D_{\min} 19, D_{\max} 36, V_{\min} 17, V_{\max} 33, pa 281–308, pm 231–258, pp 281–300. Measurements of holotype: AW 58, PW 72, SB 10, ASB 29, PSB 18, SD 47, P-PL 23, AP 23, AM 34, AL 42, PL 41, H 42, D_{\min} 25, D_{\max} 38, V_{\min} 19, V_{\max} 32, pa 288, pm 254, pp 288, Ip 830, TaIIIL 76, TaIIIW 18.

Type material examined. Holotype larva (ZMMU Tdt-205, I-108-1865) from *Meriones persicus*, Delijan, Anarbar valley, 1600 m a.s.l., 14 October 1969, coll. V.M. Neronov.

Hosts. *Meriones persicus*, *Chionomys* sp.

Distribution. Iran (Delijan, Kerman, Mashhad 2).

***Helenicula kohlsi* (Philip and Woodward, 1946)**

Neoschoengastia kohlsi Philip and Woodward, 1946: 159.

Helenicula kohlsi, Nadchatram and Traub 1971: 573, figs 32–39; Fernandes & Kulkarni 2003: 356, fig. 117.

Diagnosis. SIF = 4B-B-3-1111.0000; fPp = B/B/b(N)b(N)B; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AL > PL > AM; DS = 62–90; NDV = 110–160; Ip = 580–640; eyes 2 + 2; S₁ apical, at level of ST; f₁ posterior to S₁; tibialae I apical; f₂ posterior to S₂. Measurements (Nadchatram & Traub 1971): AW 48–56, PW 63–73, SB 9–12, ASB 24–30, PSB 9–16, SD 46, AP 19–24, AM 23–32, AL 45–60, PL 34–42, H 35–38, D_{min} 26, D_{max} 31, V_{min} 20, V_{max} 26, pa 220–230, pm 190, pp 220, Ip 580–640, TaIIIL 60, TaIIIW 16.

Type data. Holotype larva (USNM) from *Rattus mindanensis mindanensis*, Philippines, Mindoro, San Jose, 2 April 1945.

Hosts. Many species of rodents, occasionally birds (Nadchatram & Traub 1971).

Distribution. Philippines, Vietnam, Thailand, China, Nepal, India, Iran (Chamm ol Hamid).

***Helenicula lukshumiae* Nadchatram and Traub, 1971**

Helenicula lukshumiae Nadchatram and Traub, 1971: 581, figs. 63–70; Kudryashova *et al.* 1978: 162; Kudryashova 1998: 273, fig. 233.

Helenicula lanius caspica Muljarskaja, 1971: 1188, fig. 4.

Diagnosis. SIF = 5B-N-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.2; fSt = 2.2; fSc: AL > PL > AM; DS = 55–60; VS = 41–50; NDV = 98–109; Ip = 795–848; eyes 2 + 2; S₁ apical, at level of ST; f₁ posterior to S₁; tibialae I apical; f₂ anterior to S₂. Measurements of *H. lukshumiae* holotype (Nadchatram & Traub 1971): AW 52, PW 67, SB 11, ASB 26, PSB 13, SD 39, AP 22, AM –, AL 53, PL 50, S 28, H 30–35, D_{min} 20, D_{max} 30, V_{min} 20, V_{max} 30, pa 300, pm 240, pp 300, Ip 840, TaIIIL 85, TaIIIW 13.

Type data. Holotype of *Helenicula lukshumiae*, larva (USNM 9496, B59547-1) from *Calomyscus* sp., Ahmadabad, 18 November 1963, coll. H.W. Setzer.

Type material examined. Paratype of *Helenicula lanius caspica*, larva (ZMMU Tdt-2772, 676) from *Microtus arvalis*, Azerbaijan, Nagorno-Karabakh Autonomous Region, Shushinsky District, Bolshoy Kirs, 13 August 1966, coll. L.V. Muljarskaja.

Hosts. *Calomyscus* sp., *Microtus arvalis*, *Meriones persicus*, *Meriones tristrami*, *Mus musculus*.

Distribution. Azerbaijan, Iran (Abhar, Ahmadabad, Ajami, Behbahan, Chahar Taq, Mahdishahr).

***Helenicula sparsa* (Schluger, 1955)**

Neoschoengastia sparsa Schluger, 1955: 204, figs. 228–330.

Helenicula sparsa: Nadchatram & Traub 1971: 589; Kudryashova *et al.* 1978: 159, fig. 24; Kudryashova 1998: 277, fig. 237.

Diagnosis. SIF = 5B-N-3-2111.0000; fPp = B/B/BNB; fsp = 7.7.7; fCx = 1.2.4(5); fSt = 2.4(5); fSc: AL > PL > AM; DS = 108–115; VS = 72–85; NDV = 180–200; Ip = 947–987; eyes 2 + 2; S₁ apical, at level of ST; f₁ posterior to S₁; tibialae I apical; f₂ anterior to S₂. Measurements of specimens from Iran and Tadjikistan (Kudryashova 1998): AW 56–62, PW 69–75, SB 11–14, ASB 33–39, PSB 17–20, SD 50–56, AP 33–42, AM 33–39, AL 53–64, PL 45–56, H 40–53, D_{min} 20–25, D_{max} 36–45, V_{min} 20–25, V_{max} 31–45, pa 300–350, pm 258–295, pp 297–342. Measurements of one syntype (Nadchatram & Traub 1971): AW 57, PW 74, SB 14, ASB 37, PSB 19, SD 56, AP 34, AM 37, AL 70, PL 54, S 30, H 55, D_{min} 30, D_{max} 50, V_{min} 28, V_{max} 45, pa 340, pm 240, pp 305, Ip 885, TaIIIL 80, TaIIIW 15.

Type data. Syntypes (ZMMU), Tadjikistan, Kondara Gorge (38° 48' 52" N, 068° 47' 03" E).

Hosts. *Apodemus sylvaticus*, *Cricetulus migratorius*, *Meriones persicus*, *M. libycus*, *Mus musculus*, *Rattus pyctoris*, *Rhombomys opimus*. Type host is unknown.

Distribution. Tadjikistan, Kyrgyzstan, Turkmenistan, Iran (Chahar Taq, Delijan).

***Neoschoengastia apicosolenidia* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (*Neoschoengastia*) *apicosolenidia* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 778 (description), fig. 6.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-4-6-4-4-2; DS = 34; VS = 30; NDV = 64; Ip = 1186–1210; eyes 2 + 2; parasubterminala branched or absent; f₁ posterior to S₁; f₂ at level of apically slightly inflated S₂; onychotriches present. Measurements of holotype and paratype (Vercammen-Grandjean *et al.* 1970): AW 43, 42, PW 64, 63, SB 30, 30, ASB 18, 17, PSB 28, 26, SD 46, 43, AP 29, 31, AM 38, 42, AL 43, 46, PL 57, 57, H 48, 49, D_{min} 30, 30, D_{max} 42, 46, V_{min} 25, 32, V_{max} 33, 42, pa 436, 424, pm 332, 354, pp 418, 432, Ip 1186, 1210.

Type material examined. Holotype larva (IUMS) from *Passer hispaniolensis*, Kazerun, 1 November 1966, coll. C.J. Rohde.

Hosts. *Oenanthe picata*, *Passer hispaniolensis*.

Distribution. Iran (Kazerun).

***Neoschoengastia elegans* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (*Neoschoengastia*) *elegans* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 778 (description), fig. 7.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-4-6-4-4-2; DS = 34; VS = 36; NDV = 70; Ip = 1478–1530; eyes 2 + 2; parasubterminala branched; f₁ anterior to S₁; f₂ posterior to apically slightly inflated S₂. Measurements of 4 type specimens (Vercammen-Grandjean *et al.* 1970): AW 53–58, PW 72–78, SB 32–34, ASB 19–21, PSB 27–31, SD 47–50, AP 32–35, AM 42–50, AL 50–59, PL 70–84, S 32–33, H 60–68, D_{min} 39–41, D_{max} 60–66, V_{min} 33–37, V_{max} 45–46, pa 502–536, pm 448–454, pp 522–546, Ip 1478–1530.

Type material examined. Holotype larva (IUMS) from *Asellia tridens*, Kazerun, 30 October 1966, coll. C.J. Rohde.

Hosts. *Asellia tridens*, *Oenanthe picata*.

Distribution. Iran (Kazerun).

***Neoschoengastia galerida* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (*Neoschoengastia*) *galerida* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 779 (description), fig. 8.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BNB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL ≥ AL > AM; fD = 2H-6-6-4-6-4-4-2; DS = 30; VS = 30; NDV = 60; Ip = 1286–1335; eyes 2 + 2; parasubterminala branched; f₁ anterior to S₁; f₂ posterior to apically slightly inflated S₂. Measurements of 7 type specimens (Vercammen-Grandjean *et al.* 1970): AW 49–56, PW 73–81, SB 33–37, ASB 18–22, PSB 24–27, SD 42–49, AP 33–35, AM 40–45, AL 57–64, PL 60–62, S 32–34, H 53–59, D_{min} 33–39, D_{max} 47–56, V_{min} 30–34, V_{max} 39–44, pa 444–464, pm 382–395, pp 456–476, Ip 1286–1335.

Type material examined. Holotype larva (IUMS) from *Galerida cristata*, Kazerun, 27 October 1966, coll. C.J. Rohde.

Hosts. *Coracias garrulus*, *Corvus cornix*, *Galerida cristata*.

Distribution. Iran (Kazerun).

***Neoschoengastia judysouthworthi* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (Neoschoengastia) judysouthworthi Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 779 (description), fig. 9.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL \geq AL > AM; fD = 2H-6-6-4-6-4-2; DS = 30; VS = 30; NDV = 60; Ip = 1365; eyes 2 + 2; parasubterminala branched; f₁ anterior to S₁; f₂ posterior to apically slightly inflated S₂; onychotriches present. Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 51, PW 71, SB 35, ASB 21, PSB 28, SD 49, AP 33, AM 46, AL 54, PL 58, S 32, H 58, D_{min} 37, D_{max} 54, V_{min} 33, V_{max} 44, pa 480, pm 415, pp 470, Ip 1365.

Type material examined. Holotype larva (IUMS) from *Oenanthe picata*, Kazerun, 30 October 1966, coll. C.J. Rohde.

Host. *Oenanthe picata*.

Distribution. Iran (Kazerun).

Remarks. Described from a single specimen.

***Neoschoengastia kaliophthalma* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (Neoschoengastia) kaliophthalma Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 780 (description), fig. 10.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BbB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8-6-6-8-4-4-2; DS = 40; VS = 40; NDV = 80; Ip = 1425; eyes 2 + 2; parasubterminala branched; f₁ anterior to S₁; f₂ at level of S₂. Measurements of holotype and paratype (Vercammen-Grandjean *et al.* 1970): AW 57, 56, PW 82, 85, SB 38, 36, ASB 22, 23, PSB 28, 28, SD 50, 51, AP 36, 35, AM 54, 60, AL 64, 63, PL 76, 76, S 36, 36, H 66, 70, D_{min} 40, 36, D_{max} 66, 68, V_{min} 36, 37, V_{max} 54, 56, pa 508, 500, pm 432, 423, pp 500, 486, Ip 1440, 1409.

Type material examined. Holotype larva (IUMS) from *Oenanthe picata*, Mashhad, 10 May 1967, coll. C.J. Rohde.

Host. *Oenanthe picata*.

Distribution. Iran (Mashhad).

***Neoschoengastia mesghali* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (Megaschoengastia) mesghali Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 778 (description), fig. 5.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.6; fSt = 2.4; fSc: PL \geq AL > AM; fD = 10H-16-18-14-16-14-16-16-16-14-12-10-8-6-4; DS = 206; VS = 126; NDV = 332; Ip = 1208–1332; eyes 2 + 2; parasubterminala branched or absent; f₁ anterior to very long S₁ (51 μ m); f₂ posterior to apically slightly inflated S₂ (25 μ m). Measurements of 10 type specimens (Vercammen-Grandjean *et al.* 1970): AW 53–61, PW 74–83, SB 37–42, ASB 25–31, PSB 30–32, SD 55–62, AP 40–43, AM 38–45, AL 71–76, PL 73–81, H 49–53, D_{min} 38–43, D_{max} 44–50, V_{min} 36–39, V_{max} 52–58, pa 418–457, pm 388–408, pp 452–472, Ip 1208–1332.

Type material examined. Holotype larva (IUMS) from *Charadrius alexandrinus*, Bandar Abbas, 14 February 1967, coll. C.J. Rohde.

Host. *Charadrius alexandrinus*.

Distribution. Iran (Bandar Abbas).

***Neoschoengastia meshedensis* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (*Hypogastia*) *meshedensis* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 780 (description) fig. 12; Kudryashova 1998: 305, fig. 265.

Diagnosis. SIF = 7B-B-3-3111.1000; fPp = B/B/NBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AL > PL > AM; fD = 2H-10-8-6-6-4-2; DS = 44; VS = 34; NDV = 78; Ip = 774–780; eyes 2 + 2; parasubterminala branched; f₁ at level or slightly posterior to S₁; tibialae I apical; f₂ anterior to S₂; S₂ > S₁. Measurements of holotype and paratype (Vercammen-Grandjean *et al.* 1970): AW 52, 52, PW 64, 65, SB 40, 42, ASB 20, 21, PSB 29, 29, SD 49, 50, AP 32, 32, AM 42, 44, AL 52, 51, PL 46, 49, H 54, 52, D_{min} 26, 28, D_{max} 52, 52, V_{min} 28, 30, V_{max} 35, 35, pa 278, 272, pm 232, 232, pp 270, 270, Ip 780, 774.

Type material examined. Holotype larva (IUMS) from *Oenanthe hispanica*, Mashhad, 9 May 1967, coll. C.J. Rohde.

Host. *Oenanthe hispanica*.

Distribution. Iran (Mashhad).

***Neoschoengastia picata* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neoschoengastia (*Neoschoengastia*) *picata* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 780 (description), fig. 11.

Diagnosis. SIF = 7BS-B-3-3111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-4-6-4-4; DS = 32; VS = 28; NDV = 60; Ip = 1153–1205; eyes 2 + 2; parasubterminala branched; f₁ at level of S₁; f₂ near and slightly posterior to S₂; onychotriches present. Measurements of 6 type specimens (Vercammen-Grandjean *et al.* 1970): AW 42–50, PW 65–68, SB 26–31, ASB 15–17, PSB 23–26, SD 38–43, AP 27–32, AM 37–41, AL 45–51, PL 58–64, S 30–32, H 40–48, D_{min} 29–32, D_{max} 40–46, V_{min} 27–32, V_{max} 33–40, pa 404–426, pm 334–358, pp 408–428, Ip 1153–1205.

Type material examined. Holotype larva (IUMS) from *Oenanthe picata*, Kazerun, 25 October 1966, coll. C.J. Rohde.

Hosts. *Falco columbarius*, *Oenanthe picata*.

Distribution. Iran (Kazerun).

***Ornithogastia merops* (Vercammen-Grandjean, Rohde and Mesghali, 1970), comb. nov.**

Guntherana (*Ornithogastia*) *merops* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 781 (description), fig. 13.

Diagnosis. SIF = 5B-N-3-2111.4300; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.4; fSc: AL > PL > AM; fD = 2H-[4-4-2]-8-8-10-2-4-2; DS = 46; VS = 48; NDV = 94; Ip = 894; eyes 2 + 2; f₁ anterior to S₁; f₂ at level of apically slightly inflated S₂; 4 basally ciliated mastitarsalae and 3 basally ciliated mastitibialae. Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 49, PW 72, SB 20, ASB 25, PSB 24, SD 49, AP 36, AM 49, AL 64, PL 54, S 34, H 54, D_{min} 30, D_{max} 50, V_{min} 26, V_{max} 38, pa 304, pm 274, pp 316, Ip 894.

Type material examined. Holotype larva (IUMS) from *Merops apiaster*, Mashhad, 12 May 1967, coll. C.J. Rohde.

Host. *Merops apiaster*.

Distribution. Iran (Mashhad).

Remarks. Described from a single specimen. Following Kudryashova (1998), we regard *Ornithogastia* Vercammen-Grandjean, 1960 as a separate genus and thus exclude *Ornithogastia merops* from the genus *Guntherana* Womersley, 1939.

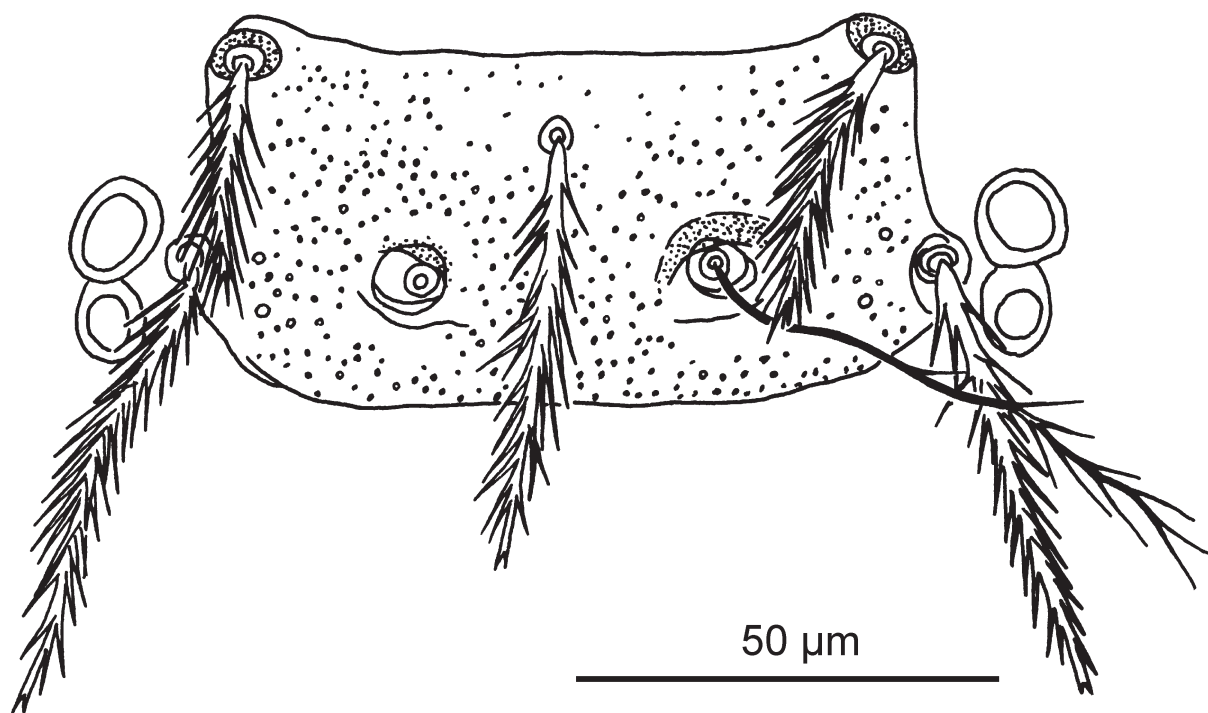


FIGURE 13. *Leptotrombidium silvaticum*, scutum.

***Ornithogastia oenanthe* (Vercammen-Grandjean, Rohde and Mesghali, 1970), comb. nov.**

Guntherana (*Ornithogastia*) *oenanthe* Vercammen-Grandjean, Rohde and Mesghali, 1970: 775 (material), 781 (description), fig. 14.

Diagnosis. SIF = 5B-N-3-2111.4300; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.4; fSc: AL > PL > AM; fD = 2H-[4-4-2]-8-8-10-6-4-4-2; DS = 54; VS = 48; NDV = 102; Ip = 1070; eyes 2 + 2; f₁ anterior to S₁; f₂ near and slightly posterior to apically slightly inflated S₂; 4 basally ciliated mastitarsalae and 3 basally ciliated mastitibialae. Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 57, PW 90, SB 26, ASB 28, PSB 24, SD 52, AP 41, AM 58, AL 72, PL 64, S 34, H 74, D_{min} 37, D_{max} 62, V_{min} 31, V_{max} 42, pa 374, pm 318, pp 378, Ip 1070.

Type material examined. Holotype larva (IUMS) from *Oenanthe picata*, Mashhad, 10 May 1967, coll. C.J. Rohde.

Host. *Oenanthe picata*.

Distribution. Iran (Mashhad).

Remarks. Described from a single specimen. Following Kudryashova (1998), we regard *Ornithogastia* Vercammen-Grandjean, 1960 as a separate genus and thus exclude *Ornithogastia oenanthe* from the genus *Guntherana* Womersley, 1939.

***Schoengastia persica* Wen, Saboori and Akrami, 2012**

Schoengastia (*Priomesochela*) *persica* Wen, Saboori and Akrami, 2012: 2, figs 1–12.

Diagnosis. SIF = 7BS-N-3-3111.2000; fPp = N/N(b)/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AL > PL >> AM; fD = 2H-8-[6-2]-6-4-2; DS = 30; VS = 23; NDV = 53; Ip = 753; cheliceral blade with 6–7 recurved dorsal teeth and 1 long ventral tooth; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂; 2 ciliated mastitarsalae. Measurements

of holotype (Wen *et al.* 2012): AW 54, PW 73, SB 21, ASB 26, PSB 23, SD 49, AP 25, AM 22, AL 46, PL 40, S 35, H 39, D_{\min} 31, D_{\max} 37, V_{\min} 25, V_{\max} 32, pa 263, pm 236, pp 254, Ip 753.

Type material examined. Holotype larva (Jalal Afshar Zoological Museum ARS-20110305-1, Department of Plant Protection, College of Agriculture, University of Tehran, Karaj, Iran) from the soil under shrub, Abarkuh, 9 September 1999, coll. M.A. Akrami.

Host. Unknown.

Distribution. Iran (Abarkuh).

Remarks. Described from a single specimen.

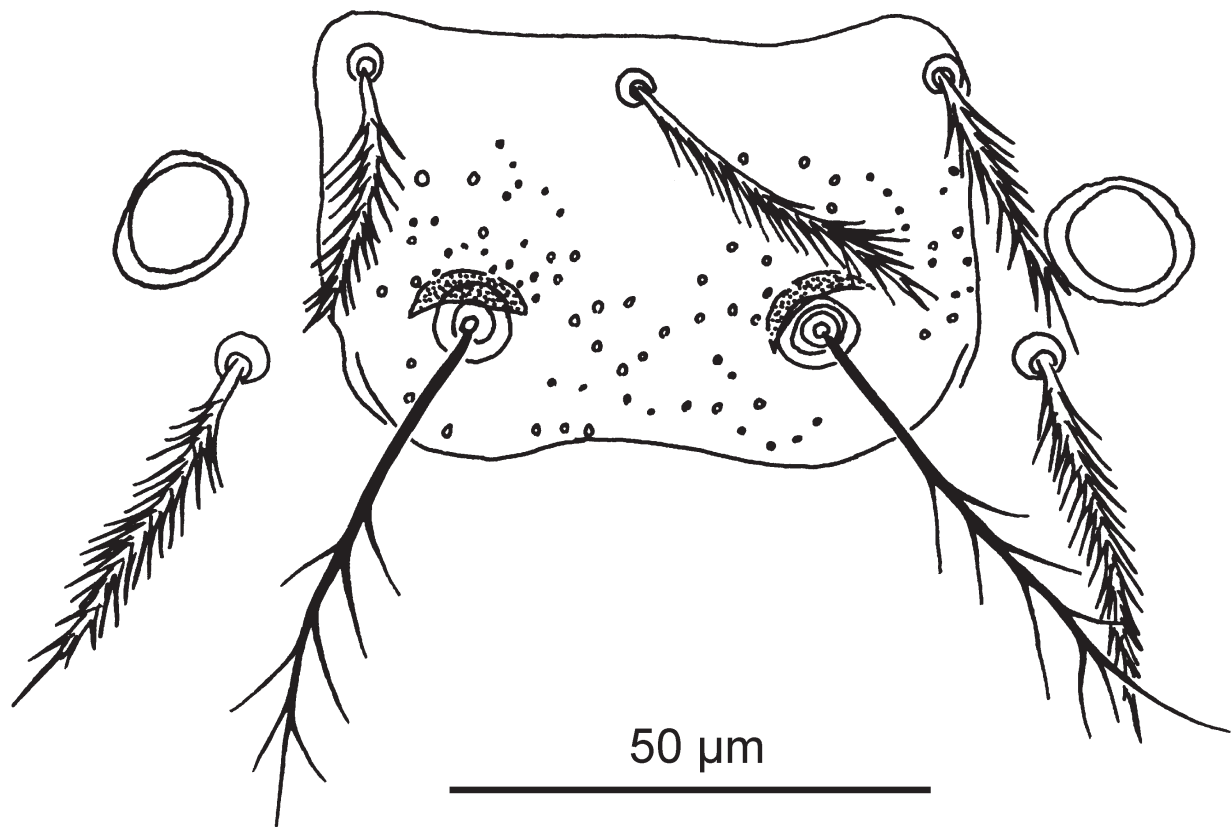


FIGURE 14. *Otorhinophila deserta*, scutum.

Schoutedenichia anatolica Kepka, 1962

(Fig. 9)

Schoutedenichia (*Schoutedenichia*) *anatolica* Kepka, 1962: 279, Abb. 4–7; Kudryashova 1998: 254, fig. 215.

Schoutedenichia anatolica: Stekolnikov & Daniel 2012: 88, fig. 61.

Kayella vercammeni Kolebinova, 1966: 675, figs. 1–6.

Schoutedenichia pallidula Schluger, 1967: 43, fig. 2.

Schoutedenichia abharica Kudryashova, 1976d: 278, fig. 4; Kudryashova *et al.*, 1978: 151.

Diagnosis. SIF = 4B-B-3-2000.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-(8–9)-(8–12)-(7–11)-(7–13)-...; DS = 48–58; VS = 44–64; NDV = 95–122; Ip = 580–679; eyes 2 + 2; f_1 at level or slightly posterior to S_1 ; f_2 slightly anterior to S_2 . Measurements of *Schoutedenichia abharica* type series (Kudryashova *et al.* 1978): AW 50–53, PW 70–76, SB 34–36, ASB 22–25, PSB 14–17, SD 36–42, AP 34, AM 25–34, AL 22–31, PL 36–39, H 31–36, D_{\min} 22, D_{\max} 31–34, V_{\min} 17–20, V_{\max} 25–31, pa 210–221, pm 193–199, pp 230–232. Measurements of *Schoutedenichia abharica* holotype: AW 52, PW 72, SB 36, ASB 23, PSB 16, SD 39,

P-PL 7, AP 33, AM 29, AL 22, PL 37, H 36, D_{\min} 22, D_{\max} 31, V_{\min} 22, V_{\max} 26, pa 218, pm 187, pp 223, Ip 628, TaIIIL 56, TaIIIW 9.

Type material examined. Holotype of *Schoutedenichia abharica*, larva (ZMMU Tdt-661, I-382-2946) from *Meriones persicus*, Ajami, 1780 m a.s.l., 14 August 1970, coll. V.M. Neronov.

Hosts. *Meriones persicus* and *Mus musculus*.

Distribution. Switzerland, Bulgaria, Romania, Ukraine, Russia (Krasnodarskiy Krai), Turkey, Iran (Abhar, Ajami).

Schoutedenichia chilmirica Kudryashova, 1975

Schoutedenichia chilmirica Kudryashova, 1975: 1564, fig. 3; Kudryashova *et al.*, 1978: 150.

Diagnosis. SIF = 4BS-N-3-2110.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL; fD = 4H-8-6-8-9-8-7-9-9-4-8-4-4; DS = 88; VS = 74; NDV = 162; Ip = 1064; eyes 2 + 2; f_1 far anterior to S_1 ; f_2 far posterior to S_2 ; $S_1 \gg S_2$. Measurements of holotype: AW 66, PW 86, SB 49, ASB 34, PSB 18, SD 52, AP 44, AL 31, PL 42, H 46, D_{\min} 27, D_{\max} 43, V_{\min} 22, V_{\max} 30, pa 340, pm 310, pp 360, Ip 1010, TaIIIL 101, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-665, I-14-596-600) from *Pipistrellus pipistrellus*, Lotfabad, garret of old house, 13 July 1969, coll. V.M. Neronov.

Host. *Pipistrellus pipistrellus*.

Distribution. Iran (Lotfabad).

Remarks. Described from a single specimen.

Schoutedenichia montchadskyi Muljarskaja, 1971

Schoutedenichia montchadskyi Muljarskaja, 1971: 1182, fig. 1.

Schoutedenichia (Brennanichia) montchadskyi: Kudryashova *et al.* 1978: 152, fig. 21.

Schoutedenichia (Ornithochia) montchadskyi: Kudryashova 1998: 260, fig. 220.

Diagnosis. SIF = 4B-N-3-2110.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.3; fSt = 2.2; fSc: AL > PL > AM; fD = 2H-6-6-6-6-4-2-2, 2H-6-6-6-8-2-4-2; DS = 34–36; VS = 26–29; NDV = 62–68; Ip = 596–661; eyes 2 + 2; f_1 at level or slightly anterior to S_1 ; f_2 slightly posterior to S_2 . Measurements of 10 specimens from Iran (Kudryashova 1998): AW 39–42, PW 45–50, SB 14–20, ASB 20, PSB 18–22, SD 38–42, AP 25–31, AM 14–20, AL 42–56, PL 22, H 25, D_{\min} 20, D_{\max} 28, V_{\min} 14, V_{\max} 25, pa 213–235, pm 176–196, pp 207–238, Ip 596–661.

Type material examined. Paratype larva (ZMMU Tdt-3036, 4605(6), not suitable for examination) from *Meriones vinogradovi*, Azerbaijan, Nakhichevansky District, Syugram, 7 September 1965, coll. L.F. Shchirova.

Hosts. *Meriones vinogradovi*, *Meriones persicus*, *Mus musculus*.

Distribution. Azerbaijan, Iran (Ajami).

Schoutedenichia originalis Kudryashova, 1976

Schoutedenichia originale Kudryashova, 1976d: 275, fig. 2; Kudryashova *et al.*, 1978: 148, fig. 20.

Schoutedenichia (Schoutedenichia) originalis: Kudryashova 1998: 251, fig. 212.

Diagnosis. SIF = 4B-N-3-2000.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; PLs extrascutal; fD = 6H-4-4-10-8-4-(4)-2; DS = 38–42; VS = 30–32; NDV = 70–72; Ip = 655–664; eyes 2 + 2; f_1 slightly anterior to S_1 ; f_2 near or slightly anterior to S_2 . Measurements of type series (Kudryashova 1998): AW 48–49, SB 34–39, ASB 17–20, PSB 8–11, SD 28, AM 17–20, AL 14–20, PL 28, H 28–31, D_{\min} 14, D_{\max} 22, V_{\min} 14–17, V_{\max} 20–22, pa 235–246, pm 196–202, pp 218–221. Measurements of holotype: AW 47, SB 39, ASB 19, AP 28, AM 18, AL 16, PL 26, H 31, D_{\min} 16, D_{\max} 23, pa 243, pm 202, pp 216, Ip 661, TaIIIL 54, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-667, I-386-3318) from *Nesokia indica*, Shushtar, 250 m a.s.l., 9–13 September 1970, coll. V.M. Neronov.

Hosts. *Nesokia indica*, *Meriones hurrianae*.

Distribution. Iran (Chabahar, Shushtar).

***Schoutedenichia rohdeae* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Schoutedenichia (Brennanichia) rohdeae Vercammen-Grandjean, Rohde and Mesghali, 1970: 776 (material), 782 (description), fig. 17.

Diagnosis. SIF = 4B-B-3-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AM ≥ AL ≥ PL; fD = 2H-[4-10]-[10-4]-10-6-6-8-6-4-2; DS = 72; VS = 48; NDV = 120; Ip = 644–678; eyes 2 + 2; AM far posterior to level of ALs; f₁ posterior to S₁; f₂ near and slightly posterior to apically slightly inflated S₂. Measurements of 9 type specimens (Vercammen-Grandjean *et al.* 1970): AW 39–44, PW 57–66, SB 22–28, ASB 25–29, PSB 10–15, SD 37–42, AP 26–31, AM 33–37, AL 30–37, PL 30–36, S 31–36, H 32–37, D_{min} 20–25, D_{max} 29–33, V_{min} 17–19, V_{max} 23–28, pa 226–239, pm 181–197, pp 230–244, Ip 644–678.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Qazvin, 1 May 1967, coll. C.J. Rohde.

Host. *Meriones persicus*.

Distribution. Iran (Qazvin).

***Schoutedenichia shirazica* Kudryashova, 1976**

Schoutedenichia shirazica Kudryashova, 1976d: 276, fig. 3; Kudryashova *et al.* 1978: 150.

Schoutedenichia (Schoutedenichia) shirazica: Kudryashova 1998: 253, fig. 214.

Diagnosis. SIF = 4B-N-3-2110.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL = AM; fD = 2H-8-2-10-8-6-2-2; DS = 40; VS = 30; NDV = 70; Ip = 784; eyes 2 + 2; f₁ slightly posterior to S₁; f₂ near S₂. Measurements of holotype: AW 58, PW 78, SB 45, ASB 24, PSB 16, SD 40, AP 37, AM 18, AL 17, PL 25, S 30, H 30, D_{min} 20, D_{max} 29, V_{min} 19, V_{max} 25, pa 238, pm 207, pp 239, Ip 684, TaIIIL 64, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-666) from *Meriones persicus*, Shiraz, 1640 m a.s.l., stony slopes of mountains, 29 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Shiraz).

Remarks. Described from a single specimen.

***Schoutedenichia zarudnyi* Kudryashova, 1976**

Schoutedenichia zarudnyi Kudryashova, 1976d: 274, fig. 1; Kudryashova *et al.* 1978: 147.

Schoutedenichia (Schoutedenichia) zarudnyi: Kudryashova 1998: 252, fig. 213.

Diagnosis. SIF = 4B-N-3-2110.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM = AL; PLs extrascutal; fD = 4H-4-4-10-8-(8)-6-2-2(1)-4-(4); DS = 46–52; VS = 30–37; NDV = 78–86; Ip = 658–688; eyes 2 + 2; f₁ near or slightly anterior to S₁; f₂ near or slightly anterior to S₂. Measurements of type series (Kudryashova 1998): AW 45–48, SB 31–35, ASB 23–27, PSB 10–14, SD 34–39, AM 17–22, AL 17–20, PL 28, H 28–34, D_{min} 17, D_{max} 25, V_{min} 14, V_{max} 22, pa 238–249, pm 196–210, pp 221–232. Measurements of holotype: AW 46, PW 61, SB 31, ASB 24, PSB 9, SD 33, AP 33, AM 18, AL 16, PL 29, H 32, D_{min} 19, D_{max} 25, V_{min} 20, V_{max} 23, pa 225, pm 191, pp 229, Ip 645, TaIIIL 61, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-670, I-131-2357) from *Meriones persicus*, Borazjan, 770 m a.s.l., southern slope of a mountain, 13 November 1969, coll. V.M. Neronov and A. Farang-Azad.

Hosts. *Meriones persicus*, *Tatera indica*.

Distribution. Iran (Borazjan, Kazerun 2).

Susa kolebinovae (Kudryashova, Neronov and Farang-Azad, 1978)

Derrickiella kolebinovae Kudryashova, Neronov & Farang-Azad, 1978: 163, fig. 25.

Susa kolebinovae: Kudryashova 1998: 267.

Diagnosis. SIF = 5B-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.2; fSc: PL ≥ AM > AL; fD = 4H-6(4)-2(4)-10(8)-10-2(3)-10-(2)-4-6-2(4); DS = 61–68; VS = 44–50; NDV = 109–118; Ip = 756–771; eyes 2 + 2; f₁ anterior to S₁; tibialae I apical; f₂ anterior to S₂; S₂ > S₁. Measurements of type series (Kudryashova *et al.* 1978): AW 56–62, PW 76–90, SB 21–28, ASB 22–24, PSB 17–20, SD 41–45, AP 25–31, AM 31–36, AL 28, PL 34–39, H 34–42, D_{min} 22, D_{max} 42, V_{min} 17, V_{max} 31, pa 266–283, pm 227–235, pp 255–263. Measurements of holotype: AW 63, PW 80, SB 28, ASB 29, PSB 15, SD 44, P-PL 10, AP 27, AM 36, AL 25, PL 34, S 34, H 40, D_{min} 23, D_{max} 36, V_{min} 23, V_{max} 30, pa 266, pm 230, pp 257, Ip 753, TaIIIL 63, TaIIIW 20.

Type material examined. Holotype larva (ZMMU Tdt-269, I-3-1782) from *Calomyscus bailwardi*, Delijan, 1600 m a.s.l., mountain slope, 14 October 1969, coll. V.M. Neronov.

Host. *Calomyscus bailwardi*.

Distribution. Iran (Delijan).

Susa vorax (Schluger and Amanguliev, 1975)

Guntherana vorax Schluger and Amanguliev, 1975: 468, figs. 20–26.

Susa vorax: Kudryashova 1998: 267, fig. 227.

Derrickiella danieli Kudryashova *et al.*, 1978: 165, fig. 26.

Diagnosis. SIF = 5B-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.4(5–6); fSc: PL > AM > AL; fD = 4H-6-6-10-10-2-2-6-4-2-2; DS = 54–64; VS = 45–55; NDV = 112; Ip = 730–778; eyes 2 + 2; f₁ at level or slightly posterior to S₁; tibialae I apical; f₂ anterior to S₂; S₂ > S₁. Measurements of *Derrickiella danieli* type series (Kudryashova *et al.* 1978): AW 53–62, PW 73–84, SB 25–31, ASB 19–22, PSB 17–20, SD 36–39, AP 25–28, AM 28–34, AL 22–28, PL 34–39, H 36–42, D_{min} 22, D_{max} 42, V_{min} 17, V_{max} 31, pa 263–280, pm 213–238, pp 246–263. Measurements of *Derrickiella danieli* holotype: AW 54, PW 76, SB 25, ASB 22, PSB 18, SD 40, P-PL 13, AP 26, AM 31, AL 24, PL 35, S 37, H 40, D_{min} 23, D_{max} 38, V_{min} 20, V_{max} 31, pa 256, pm 207, pp 232, Ip 695, TaIIIL 59, TaIIIW 18.

Type material examined. Holotype of *Guntherana vorax*, larva (ZMMU Tdt-2561, K-10) from *Ochotona rufescens*, Turkmenistan, Firyuza, 17 February 1967, coll. A.A. Amanguliev.

Type material examined. Holotype of *Derrickiella danieli*, larva (ZMMU Tdt-277, I-254-3887) from *Meriones libycus*, Mashhad 2, 1100 m a.s.l., 15 October 1970, coll. V.M. Neronov.

Hosts. *Ochotona rufescens*, *Meriones libycus*, *Calomyscus bailwardi*.

Distribution. Turkmenistan, Iran (Mashhad 2).

Tribe Trombiculini Vercammen-Grandjean, 1960

Chiroptella vavilovi Kudryashova, 1975

Chiroptella (*Chiroptella*) *vavilovi* Kudryashova, 1975: 1562, fig. 1; Kudryashova *et al.* 1978: 120, fig. 11.

Diagnosis. SIF = 7BS-N-3-2100.1121; fPp = N/N/NNN; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-8-8-9-6-2-4-4; DS = 41–43; VS = 29–38; NDV = 70–81; Ip = 1058–1067; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of holotype and paratype (Kudryashova *et al.* 1978): AW 45, 45, PW 78, 78, SB 24, 24, ASB 42, PSB 14, SD 56, AP 42, AM 50, 56, AL 28, 31, PL 67, 62, H 50, 53, D_{min} 31, 34, D_{max} 50, 50, V_{min} 31, 34, V_{max} 50, 50, pa 372, 378, pm 322, 322, pp 364, 367. Measurements of holotype: AW 40, PW 66, SB 22, ASB 31, PSB 18, SD 49, P-PL 9, AP 37, AM 50, AL 27, PL 65, H 50, D_{min} 32, D_{max} 47, V_{min} 30, V_{max} 45, pa 299, pm 292, pp 342, Ip 933, TaIIIL 108, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-708, I-330-3333) from *Rhinopoma hardwickii*, Shushtar, 250 m a.s.l., 9 September 1970, coll. V.M. Neronov.

Host. *Rhinopoma hardwickii*.

Distribution. Iran (Shushtar).

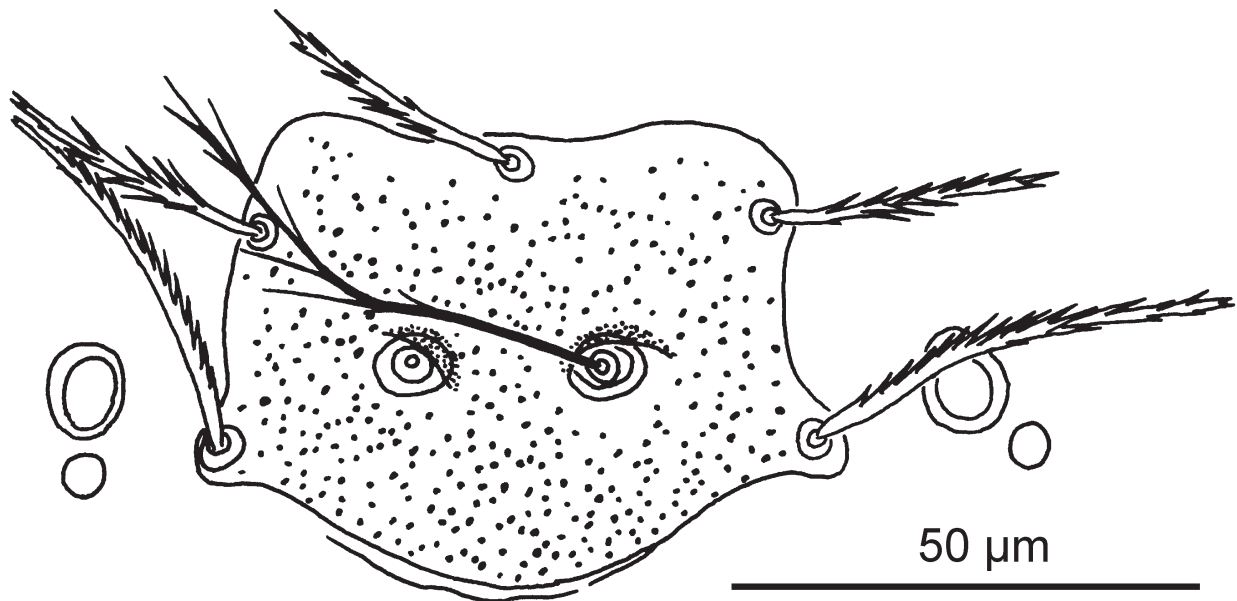


FIGURE 15. *Microtrombicula azerbaijanica*, scutum.

Ericotrombidium biconcavum (Kudryashova, 1976)

Leptotrombidium (*Ericotrombidium*) *biconcavum* Kudryashova, 1976a: 39, fig. 4; Kudryashova *et al.* 1978: 118.

Ericotrombidium biconcavum: Kudryashova 2004: 15.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8-6-6-4-2-4; DS = 32–34; VS = 20–29; NDV = 53–61; Ip = 784–843; eyes 2 + 2; f₁ anterior to S₁; f₂ anterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 64–70, PW 76–81, SB 25–28, ASB 25–31, PSB 11–14, SD 36–42, AP 25–28, AM 25–28, AL 31–36, PL 36–42, S 59–62, H 31–39, D_{min} 28, D_{max} 45, V_{min} 22, V_{max} 42, pa 263–286, pm 249–260, pp 272–297. Measurements of holotype: AW 66, PW 72, SB 23, ASB 28, PSB 13, SD 41, P-PL 9, AP 30, AM 25, AL 31, PL 35, H 33, D_{min} 27, D_{max} 43, V_{min} 26, V_{max} 41, pa 236, pm 221, pp 254, Ip 711, TaIIIL 70, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-518, I-194-2761) from *Meriones persicus*, Abhar, 1750 m a.s.l., 8 August 1970, coll. V.M. Neronov.

Hosts. *Meriones persicus*, *Cricetulus migratorius*.

Distribution. Iran (Abhar, Delijan, Urmia).

Ericotrombidium iranicus (Kudryashova, 1976)

(Fig. 16)

Leptotrombidium (*Ericotrombidium*) *iranicus* Kudryashova, 1976a: 36, fig. 2; Kudryashova *et al.* 1978: 116.

Ericotrombidium iranicus: Kudryashova 2004: 22.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/NbB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc = PL > AL > AM; fD = 2H-8-6-6-4-2-2-4; DS = 32–34; VS = 24–30; NDV = 57–62; Ip = 871–925; eyes 2 + 2; f₁ anterior to S₁; f₂

anterior to S_2 . Measurements of type series (Kudryashova *et al.* 1978): AW 62–67, PW 76–78, SB 25, ASB 25–28, PSB 11–14, SD 39–42, AP 25–28, AM 28–34, AL 34–36, PL 42–45, S 64–70, H 36–42, D_{\min} 31, D_{\max} 45, V_{\min} 28, V_{\max} 39, pa 300–316, pm 266–286, pp 302–325. Measurements of holotype: AW 69, PW 79, SB 25, ASB 29, PSB 13, SD 42, P-PL 12, AP 25, AM 29, AL 36, PL 44, H 43, D_{\min} 35, D_{\max} 43, V_{\min} 29, V_{\max} 38, pa 322, pm 283, pp 324, Ip 929, TaIIIL 94, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-578, I-205-1052) from *Mus musculus*, Shurak Maleki, 30 July 1969, coll. V.M. Neronov.

Host. *Mus musculus*.

Distribution. Iran (Maku, Mehr, Shurak Maleki).

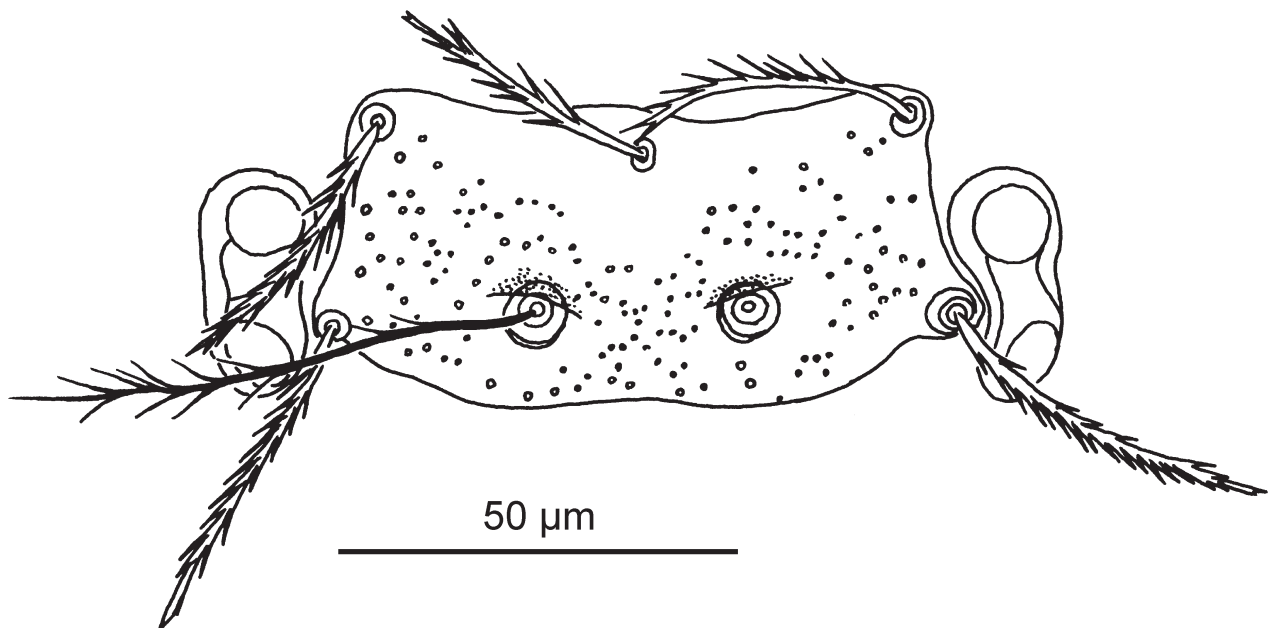


FIGURE 16. *Ericotrombidium iranicus*, scutum.

Ericotrombidium jayewickremei (Womersley, 1952)

Trombicula (*Neotrombicula*) *jayewickremei* Womersley, 1952: 138, Pl. 26, figs. F–J.

Leptotrombidium (*Hypotrombidium*) *jayewickremei*: Vercammen-Grandjean & Langston 1976: 729, Pl. 215.

Leptotrombidium (*Ericotrombidium*) *jayewickremei*: Kudryashova *et al.* 1978: 114, fig. 10.

Ericotrombidium jayewickremei: Kudryashova 1998: 134, fig. 94.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM ≥ AL; fD = 2H-8-6-6-4-2-2; DS = 29–34; VS = 23–32; NDV = 59; Ip = 804–882; eyes 2 + 2; f_1 anterior to S_1 ; f_2 slightly anterior to S_2 . Measurements (Vercammen-Grandjean & Langston 1976): AW 64–67, PW 73–81, SB 24–28, ASB 25–28, PSB 11–13, SD 36–41, AP 25–27, AM 33–50, AL 40–45, PL 44–50, S 56–70, H 42–43, D_{\min} 34–38, D_{\max} 41–50, V_{\min} 28–30, V_{\max} 39–42, pa 310–319, pm 261–266, pp 312–314, Ip 883–899.

Type data. Syntypes (South Australian Museum, Adelaide, South Australia, Australia) from *Rattus rattus kandiyanus*, Sri Lanka, September–November 1944, coll. S.H. Jayewickreme.

Hosts. *Cricetulus migratorius*, *Crocidura suaveolens*, *Crocidura* sp., *Mus* sp., *Nesokia indica*, *Rattus pycoris*, *R. rattus*, *Suncus* sp., *Tatera indica* (Kudryashova 1998).

Distribution. Sri Lanka, India, Pakistan, Tadjikistan, Iran (Zahedan).

***Ericotrombidium kazeruni* (Kudryashova, 1976)**

Leptotrombidium (*Ericotrombidium*) *kazeruni* Kudryashova, 1976a: 39, fig. 5; Kudryashova *et al.* 1978: 119.

Ericotrombidium kazeruni: Kudryashova 2004: 22.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL ≥ AM; fD = 2H-8-6-6-4-2-2-5; DS = 30–35; VS = 22–27; NDV = 54–60; Ip = 860–901; eyes 2 + 2; f₁ anterior to S₁; f₂ slightly anterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 59–64, PW 64–70, SB 22–25, ASB 25–28, PSB 8–11, SD 36–39, AP 25–28, AM 25–31, AL 31–34, PL 39–42, S 56–62, H 34–36, D_{min} 28, D_{max} 39, V_{min} 25, V_{max} 39, pa 300–308, pm 260–274, pp 300–319.

Type material examined. Holotype larva (ZMMU Tdt-568, I-216-2276, not suitable for examination) from *Tatera indica*, Kazerun 2, 770 m a.s.l., bush along the river and deposits on river terraces, 6 November 1969, coll. V.M. Neronov.

Host. *Tatera indica*.

Distribution. Iran (Kazerun 2).

***Ericotrombidium limpidum* (Kudryashova, 1976)**

Leptotrombidium (*Ericotrombidium*) *limpidum* Kudryashova, 1976a: 36, fig. 3; Kudryashova *et al.* 1978: 117.

Ericotrombidium limpidum: Kudryashova 2004: 24.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/NbB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8-6-6-4-2-4; DS = 30–36; VS = 24–33; NDV = 56–65; Ip = 769–792; eyes 2 + 2; f₁ anterior to S₁; f₂ far anterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 56–62, PW 64–73, SB 22–25, ASB 25, PSB 11–14, SD 36–39, AP 25, AM 25–28, AL 28–31, PL 31–34, S 56, H 28–34, D_{min} 25, D_{max} 34, V_{min} 20, V_{max} 34, pa 263–277, pm 227–244, pp 266–277.

Type material examined. Holotype larva (ZMMU Tdt-539, I-187-2946, not suitable for examination) from *Meriones persicus*, Ajami, 1780 m a.s.l., 14 August 1970, coll. V.M. Neronov.

Hosts. *Meriones persicus*, *Mus musculus*.

Distribution. Iran (Abhar, Ajami, Urmia).

***Hirsutiella llogorensis* (Daniel, 1960)**

(Fig. 17)

Trombicula (*Neotrombicula*) *llogorensis* Daniel, 1960: 25, figs. 3–5.

Hirsutiella llogorensis: Kudryashova *et al.* 1978: 139; Kudryashova 1998: 242, fig. 203; Stekolnikov 2001c: 228, fig. 4; Stekolnikov & Daniel 2012: 24, fig. 15.

Diagnosis. SIF = 7BS-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; DS = 70–104; VS = 53–93; NDV = 143–186; Ip = 842–1026; eyes 2 + 2; f₁ anterior to S₁; f₂ far posterior to S₂. Measurements (Stekolnikov 2001c): AW 62–77, PW 72–90, SB 29–37, ASB 35–43, PSB 14–20, SD 50–60, AP 23–31, AM 35–50, AL 38–58, PL 50–65, S 61–88, H 49–68, D_{min} 34–47, D_{max} 58–70, V_{min} 22–32, V_{max} 49–60, pa 281–353, pm 256–320, pp 293–355, Ip 842–1026.

Type data. Holotype larva (Institute of Parasitology, Biology Centre of ASCR, Česke Budejovice, Czech Republic) from *Apodemus flavicollis*, Albania, Llogora pass, 1050 m a.s.l., 12 May 1958, coll. M. Daniel.

Hosts. *Chionomys gud*, *Ch. roberti*, *Cricetulus migratorius*, *Microtus agrestis*, *M. daghestanicus*, *M. majori*, *Apodemus agrarius*, *A. flavicollis*, *A. ponticus*, *A. uralensis*, *Garrulus glandarius* (Stekolnikov & Daniel 2012).

Distribution. France, Albania, Kosovo, Bulgaria, Russia (Krasnodarskiy Krai, Stavropolskiy Krai, Kabardino-Balkaria, North Ossetia, Dagestan), Turkey, Georgia, Azerbaijan, Armenia, Iran (Chalus).

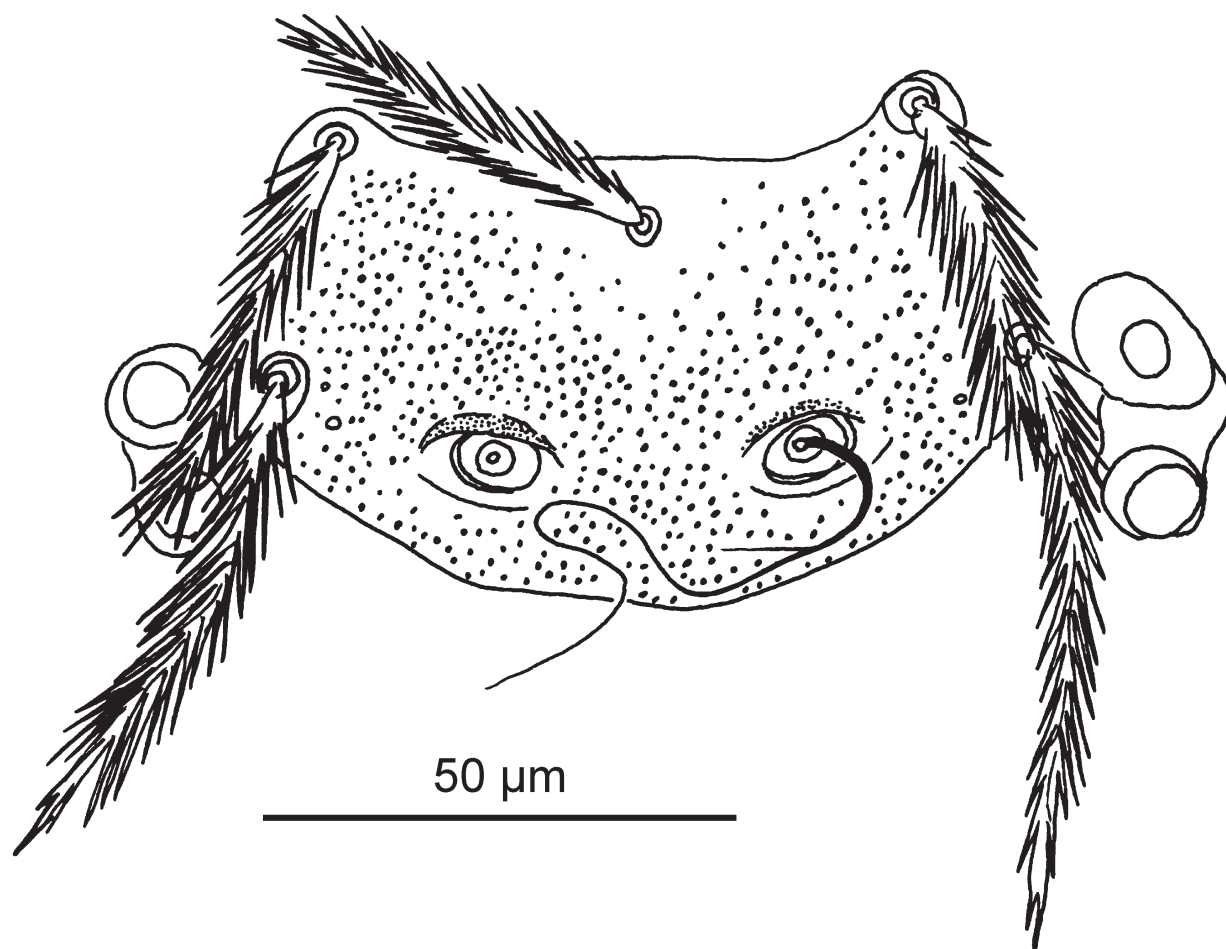


FIGURE 17. *Hirsutiella llogorensis*, scutum.

***Kepkatrombicula blanfordi* (Kudryashova, 1977)**
(Fig. 18)

Neotrombicula blanfordi Kudryashova, 1977: 47, fig. 2; Kudryashova *et al.* 1978: 128.

Eutonella blanfordi: Kudryashova 1998: 156; Stekolnikov 2001b: 100.

Kepkatrombicula blanfordi: Kudryashova & Stekolnikov 2010: 79.

Neotrombicula iranensis Goff and Saboori, 1998: 859, fig. 2.

Diagnosis. SIF = 7BS-N-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-11-7-6-6-30; DS = 62; VS = 38; NDV = 100; Ip = 885; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of holotype: AW 72, PW 83, SB 29, ASB 29, PSB 32, SD 61, P-PL 26, AP 26, AM 29, AL 35, PL 41, S 59, H 44, D_{min} 41, D_{max} 45, V_{min} 27, V_{max} 42, pa 301, pm 259, pp 297, Ip 857, TaIIIL 83, TaIIIW 18. Measurements of *Neotrombicula iranensis* type series (Goff & Saboori 1998): AW 67–70, PW 81–83, SB 29–31, ASB 29–31, PSB 33–34, AP 26–28, AM 25–28, AL 38–40, PL 41, S 64–70, H 44–46, D_{min} 33, D_{max} 42, V_{min} 29, V_{max} 42, pa 294–302, pm 258–268, pp 304–322, Ip 857–892, TaIIIL 87, TaIIIW 16.

Type material examined. Holotype larva of *Neotrombicula blanfordi* (ZMMU Tdt-65, I-142-1787) from *Meriones persicus*, Delijan, 1600 m a.s.l., 14 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Delijan, Kabudarahang).

Remarks. Described from a single specimen.

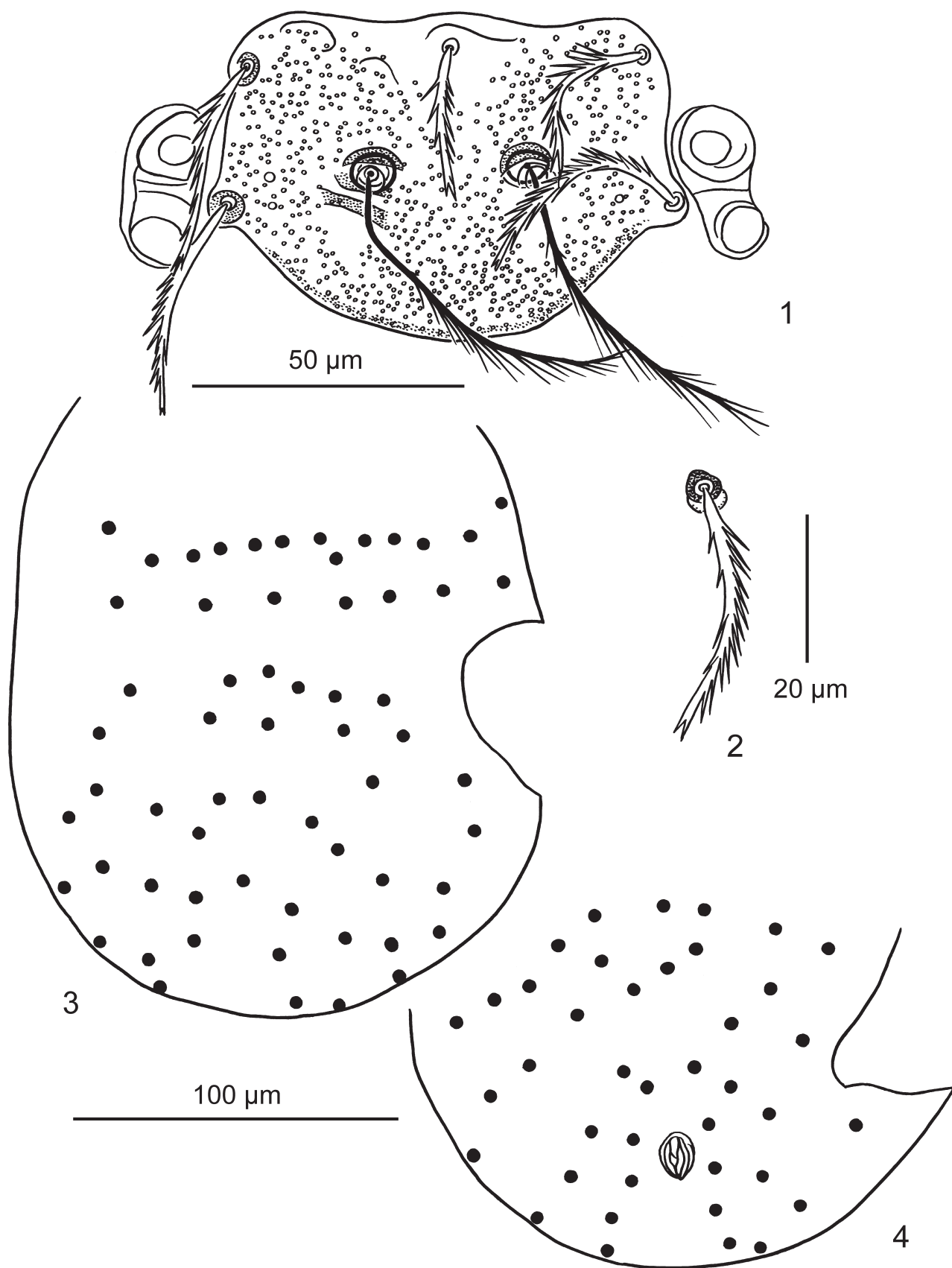


FIGURE 18. *Kepkatrombicula blanfordi*, holotype. 1, scutum and eyes; 2, dorsal idiosomal seta of 1st row; 3, arrangement of dorsal idiosomal setae; 4, arrangement of ventral idiosomal setae. Scale bars: 50 µm (1), 20 µm (2), 100 µm (3, 4).

***Kepkatrombicula horti* (Kudryashova, 1977)**

(Fig. 20)

Neotrombicula horti Kudryashova, 1977: 55, fig. 7; Kudryashova *et al.* 1978: 133.

Eutonella horti: Stekolnikov 2001b: 102.

Kepkatrombicula horti: Kudryashova & Stekolnikov 2010: 80.

Diagnosis. SIF = 7BS-N-3-2111.1000; fPp = B/B/NBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-[8-7]-[7-6]-10-8-6-4; DS = 51–61; VS = 40–43; NDV = 94–101; Ip = 1078–1109; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 81–84, PW 92–95, SB 35–36, ASB 34–36, PSB 28–31, SD 64–67, AP 22–28, AM 42–45, AL 50–56, PL 62–73, S 76–78, H 67–73, D_{min} 48–53, D_{max} 67–73, V_{min} 39–42, V_{max} 56–62, pa 378–381, pm 316–336, pp 384–398. Measurements of holotype: AW 83, PW 90, SB 32, ASB 34, PSB 33, SD 67, P-PL 36, AP 23, AM 40, AL 54, PL 72, S 83, H 75, D_{min} 52, D_{max} 69, V_{min} 41, V_{max} 67, pa 349, pm 310, pp 358, Ip 1017, TaIIIL 112, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-51, I-157-3852) from *Chionomys nivalis*, Mashhad 2, 1100 m a.s.l., 15–19 October 1970, coll. V.M. Neronov.

Host. *Chionomys nivalis*.

Distribution. Iran (Mashhad 2).

***Leptotrombidium silvaticum* Hushcha and Schluger, 1967**

(Fig. 13)

Leptotrombidium silvaticum Hushcha and Schluger, 1967: 71, figs. 1, 2; Kudryashova *et al.* 1978: 111; Kudryashova 1998: 111, fig. 71; Stekolnikov 2013: 61.

Leptotrombidium (*Leptotrombidium*) *pakistanum* Vercammen-Grandjean and Langston, 1976: 397, pl. 89.

Diagnosis. SIF = 7B-B-3-2111.0000; fPp = N/N/BNN; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL ≥ AM > AL; fD = 2H-8-6-6-4-2; DS = 34; VS = 29; NDV = 63; Ip = 773–842; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements (Stekolnikov 2013): AW 67–79, PW 81–92, SB 32–38, ASB 25–32, PSB 16–18, SD 39–49, AP 20–30, AM 53–65, AL 36–45, PL 56–67, S 63–84, H 54–66, D_{min} 34–48, D_{max} 50–64, V_{min} 22–25, V_{max} 45–54, pa 254–292, pm 236–268, pp 263–290.

Type data. Type series in the Schmalhausen Institute of Zoology NAS of Ukraine (Kyiv, Ukraine).

Hosts. Fourteen species of rodents and insectivores (Kudryashova, 1998).

Distribution. Moldova, Ukraine, Azerbaijan, Iran (Chalus, Sefidrud).

***Leptotrombidium subsilvaticum* Kudryashova, 1976**

Leptotrombidium subsilvaticum Kudryashova, 1976a: 33, fig. 1; Kudryashova *et al.* 1978: 112, fig. 9.

Diagnosis. SIF = 7B-B-3-2111.0000; fPp = N/N/BNN; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-8-8-8-6-2-2; DS = 34–38; VS = 28–36; NDV = 64–73; Ip = 773–826; eyes 2 + 2; f₁ anterior to S₁; f₂ at level or slightly posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 70–81, PW 81–92, SB 31–39, ASB 28–32, PSB 17–20, SD 45–49, AP 24–28, AM 50–62, AL 39–42, PL 62–70, S 56–76, H 59–70, D_{min} 42, D_{max} 67, V_{min} 28, V_{max} 59, pa 272–283, pm 235–258, pp 266–288. Measurements of holotype: AW 71, PW 83, SB 33, ASB 27, PSB 18, SD 45, P-PL 18, AP 23, AM 52, AL 41, PL 65, H 60, D_{min} 43, D_{max} 61, V_{min} 32, V_{max} 50, pa 241, pm 223, pp 254, Ip 718, TaIIIL 65, TaIIIW 20.

Type material examined. Holotype larva (ZMMU Tdt-491, I-334-181) from *Apodemus sylvaticus*, Gorgan, deciduous forest, 22 June 1969, coll. V.M. Neronov.

Host. *Apodemus sylvaticus*.

Distribution. Iran (Darabad, Gorgan).

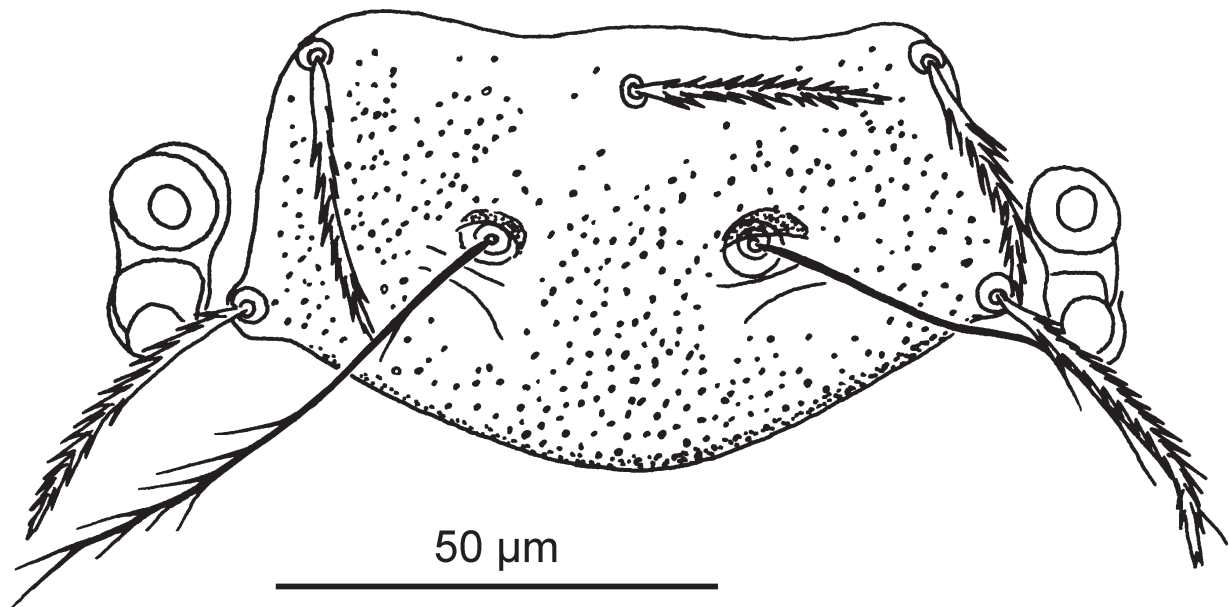


FIGURE 19. *Neotrombicula delijani*, scutum.

***Microtrombicula azerbaijanica* Muljarskaja, Verdieva and Tchirkova, 1970**

(Fig. 15)

Microtrombicula azerbaijanica Muljarskaja, Verdieva and Tchirkova, 1970: 930, fig.; Kudryashova 1998: 83, fig. 46.

Eltonella azerbaijanica: Kudryashova *et al.* 1978: 102, fig. 5.

Diagnosis. SIF = 6B-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-6-4(5)-(4)-(2); DS = 31–36; VS = 30–45; NDV = 66–75; Ip = 680–748; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of 11 Iranian specimens (Kudryashova 1998): AW 50–59, PW 64–70, SB 20–22, ASB 28, PSB 22–28, SD 50–56, AP 22–25, AM 28–31, AL 28–36, PL 42–48, S 56–64, H 42–48, D_{min} 28, D_{max} 42, V_{min} 20, V_{max} 34, pa 241–260, pm 210–230, pp 232–260.

Type data. Holotype larva (ZMMU Tdt-2777, 5911v) from *Mustela nivalis*, Azerbaijan, Lenkoranskiy District, Gilyakeran Village, 100–150 m a.s.l., 7 October 1963, coll. N.V. Chirkova.

Hosts. *Mustela nivalis*, *Sorex araneus* and 18 species of rodents (Kudryashova, 1998).

Distribution. Azerbaijan, Armenia, Iran (Abhar, Ajami, Delijan, Hajiabad, Kazerun 2, Maku, Zarrin Shahr).

***Microtrombicula galerida* (Vercammen-Grandjean, Rohde and Mesghali, 1970), comb. nov.**

Eltonella (*Eltonella*) *galerida* Vercammen-Grandjean, Rohde and Mesghali, 1970: 774 (material), 777 (description), fig. 3.

Diagnosis. SIF = 6B-N-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-8-8-6-4-4-2; DS = 34; VS = 34; NDV = 68; Ip = 754–788; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of holotype and paratype (Vercammen-Grandjean *et al.* 1970): AW 60, 59, PW 66, 69, SB 23, 21, ASB 25, 24, PSB 26, 27, SD 51, 51, AP 24, 26, AM 36, 40, AL 31, 32, PL 44, 47, S 82, 80, H 43, 44, D_{min} 30, 31, D_{max} 38, 39, V_{min} 28, 27, V_{max} 35, 36, pa 282, 268, pm 232, 222, pp 274, 264, Ip 788, 754.

Type material examined. Holotype larva (IUMS) from *Galerida cristata*, Bandar Abbas, 16 February 1967, coll. C.J. Rohde.

Hosts. *Columba livia*, *Galerida cristata*.

Distribution. Iran (Bandar Abbas).

Remarks. Following Kudryashova (1998), we regard *Eltonella* Audy, 1956 as a synonym of *Microtrombicula* Ewing, 1950 and thus propose here the new combination *Microtrombicula galerida*.

***Microtrombicula media* (Kudryashova, 1976)**

Eltonella media Kudryashova, 1976c: 303, figs. 2, 3; Kudryashova *et al.* 1978: 108.

Microtrombicula media: Kudryashova 2004: 25.

Diagnosis. SIF = 6B-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.4; fSc: PL > AM > AL; fD = 2H-8-6-6-2(3)-4-2-4; DS = 34–35; VS = 33–40; NDV = 67–74; Ip = 655–694; eyes 1 + 1; ST and pST absent; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 34–36, PW 42, SB 18–20, ASB 24, PSB 21, SD 45, AP 20–22, AM 28, AL 20–22, PL 34–36, S 45–48, H 34–36, D_{min} 28, D_{max} 34, V_{min} 20, V_{max} 28, pa 232–249, pm 199–207, pp 224–238. Measurements of holotype: AW 36, PW 39, SB 18, ASB 27, PSB 20, SD 47, P-PL 15, AP 22, AM 24, AL 20, PL 32, H 32, D_{min} 27, D_{max} 33, V_{min} 17, V_{max} 24, pa 216, pm 187, pp 218, Ip 621, TaIII 63, TaIIW 12.

Type material examined. Holotype larva (ZMMU Tdt-344, I-425-4228) from *Meriones persicus*, Takht Malek, dry riverbed with bush, 720 m a.s.l., 19 November 1970, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Takht Malek).

***Microtrombicula meriones* (Vercammen-Grandjean, Rohde and Mesghali, 1970), comb. nov.**

Eltonella (*Eltonella*) *meriones* Vercammen-Grandjean, Rohde and Mesghali, 1970: 774 (material), 777 (description), fig. 4.

Diagnosis. SIF = 6B-N-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AM ≥ PL > AL; fD = 2H-6-6-4-4-4-2; DS = 32; VS = 36; NDV = 68; Ip = 677; eyes 1 + 1; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of holotype (Vercammen-Grandjean *et al.* 1970): AW 57, PW 71, SB 22, ASB 28, PSB 27, SD 55, AP 27, AM 40, AL 27, PL 39, H 44, D_{min} 28, D_{max} 37, V_{min} 21, V_{max} 32, pa 236, pm 206, pp 235, Ip 677.

Type material examined. Holotype larva (IUMS) from *Meriones persicus*, Tehran, 3 October 1966, coll. C.J. Rohde.

Host. *Meriones persicus*.

Distribution. Iran (Tehran).

Remarks. Described from a single specimen. Following Kudryashova (1998), we regard *Eltonella* Audy, 1956 as a synonym of *Microtrombicula* Ewing, 1950 and thus propose here the new combination *Microtrombicula meriones*.

***Microtrombicula potamophila* (Kudryashova, 1976)**

Eltonella potamophila Kudryashova, 1976c: 299, fig. 1; Kudryashova *et al.* 1978: 99, fig. 3.

Microtrombicula potamophila: Kudryashova 2004: 30.

Diagnosis. SIF = 6B-B(N)-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL ≥ AM > AL; fD = 2H-6-6-4-4-4-2; DS = 27–29; VS = 30–44; NDV = 58; Ip = 733–789; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 39–42, PW 45–48, SB 17–20, ASB 25, PSB 23–25, SD 48–50, AP 23–25, AM 31–36, AL 23–28, PL 34–36, S 50–59, H 39–42, D_{min} 28, D_{max} 36, V_{min} 20, V_{max} 28, pa 260–280, pm 218–235, pp 255–274. Measurements of holotype: AW 43, PW 45, SB 16, ASB 25, PSB 23, SD 48, P-PL 16, AP 23, AM 27, AL 27, PL 32, H 43, D_{min} 29, D_{max} 38, V_{min} 23, V_{max} 29, pa 261, pm 214, pp 254, Ip 729, TaIII 78, TaIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-384, I-414-3594) from *Mus musculus*, Darkhovin, 190 m a.s.l., 13 September 1970, coll. V.M. Neronov.

Hosts. *Mus musculus*, *Gerbillus nanus*, *Nesokia indica*.

Distribution. Iran (Darkhovin).

***Microtrombicula similata* Schluger and Amanguliev, 1972**

Microtrombicula similata Schluger and Amanguliev, 1972: 44, fig. 1B.

Eltonella similata: Kudryashova *et al.* 1978: 101, fig. 4.

Microtrombicula similata: Kudryashova 1998: 87, fig. 49.

Diagnosis. SIF = 6B-N-3-2(3)111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-6-6-4-4-4-2; DS = 30–32; VS = 45–50; NDV = 78–82; Ip = 719–780; eyes 1 + 1; f₁ anterior to S₁; f₂ posterior to S₂; S₂ longer than S₁. Measurements of two Iranian specimens: AW 53, 54, PW 55, 52, SB 21, 23, ASB 31, 27, PSB 23, 23, SD 54, 50, P-PL 14, 13, AP 27, 27, AM 37, 31, AL 25, 25, PL 45, 43, H 48, 41, D_{min} 31, 30, D_{max} 39, 38, V_{min} 22, 21, V_{max} 34, 30, pa 263, 277, pm 216, 229, pp 257, 263, Ip 736, 769, TaIIIL 74, 72, TaIIIW 14, 16.

Type data. Holotype larva (ZMMU Tdt-2469, K-13) from *Meriones persicus*, Turkmenistan, Western Kopetdagh, Syunt-Khasardag Reserve, Yol Dere valley, 10 May 1969, coll. A.A. Amanguliev.

Material examined. Two larvae (ZMMU Tdt-371, I-358-3702; Tdt-382, No. 3702) from *M. persicus*, Iran, Mahdishahr, 1850 m a.s.l., 6–8 October 1970.

Host. *Meriones persicus*.

Distribution. Turkmenistan, Iran (Mahdishahr, Mashhad 2).

***Microtrombicula subtilissima* (Kudryashova, 1976)**

Eltonella subtilissima Kudryashova, 1976c: 301, figs. 2, 3; Kudryashova *et al.* 1978: 105, fig. 6.

Microtrombicula subtilissima: Kudryashova 2004: 33.

Diagnosis. SIF = 6B-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.4; fSc: PL > AM > AL; fD = 2H-8-6-6-4-2; DS = 34; VS = 43; NDV = 77; Ip = 594–604; eyes 2 + 2; ST and pST absent; f₁ anterior to S₁; f₂ anterior to S₂; S₂ longer than S₁. Measurements of holotype: AW 34, PW 36, SB 17, ASB 20, PSB 22, SD 42, P-PL 16, AP 19, AM 27, AL 20, PL 33, H 40, D_{min} 25, D_{max} 31, V_{min} 16, V_{max} 25, pa 209, pm 169, pp 202, Ip 580, TaIIIL 54, TaIIIW 13.

Type material examined. Holotype larva (ZMMU Tdt-367, I-373-2024) from *Calomyscus bailwardi*, Zarrin Shahr, 1440 m a.s.l., stony river terrace, 21 October 1969, coll. V.M. Neronov.

Host. *Calomyscus bailwardi*.

Distribution. Iran (Zarrin Shahr).

***Microtrombicula tenera* (Kudryashova, 1976)**

Eltonella tenera Kudryashova, 1976c: 303, figs. 2, 3; Kudryashova *et al.* 1978: 106, fig. 7.

Microtrombicula tenera: Kudryashova 2004: 34.

Diagnosis. SIF = 6B-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.4; fSc: PL > AM > AL; fD = 2H-8-6-6-4-2-2(4); DS = 30–32; VS = 31–42; NDV = 61–75; Ip = 608–633; eyes 2 + 2; ST and pST absent; genualae I proximal; f₁ anterior to S₁; f₂ slightly posterior to S₂; S₂ longer than S₁. Measurements of type series (Kudryashova *et al.* 1978): AW 34–36, PW 36–42, SB 17, ASB 22–24, PSB 21–23, SD 43–46, AP 20–22, AM 28, AL 17–20, PL 31–34, S 42, H 34–36, D_{min} 22, D_{max} 28, V_{min} 14, V_{max} 28, pa 216–227, pm 182–190, pp 207–218. Measurements of holotype: AW 35, PW 40, SB 16, ASB 22, PSB 21, SD 43, P-PL 14, AP 21, AM 27, AL 19, PL 32, H 40, D_{min} 22, D_{max} 31, V_{min} 16, V_{max} 22, pa 225, pm 185, pp 207, Ip 617, TaIIIL 56, TaIIIW 13.

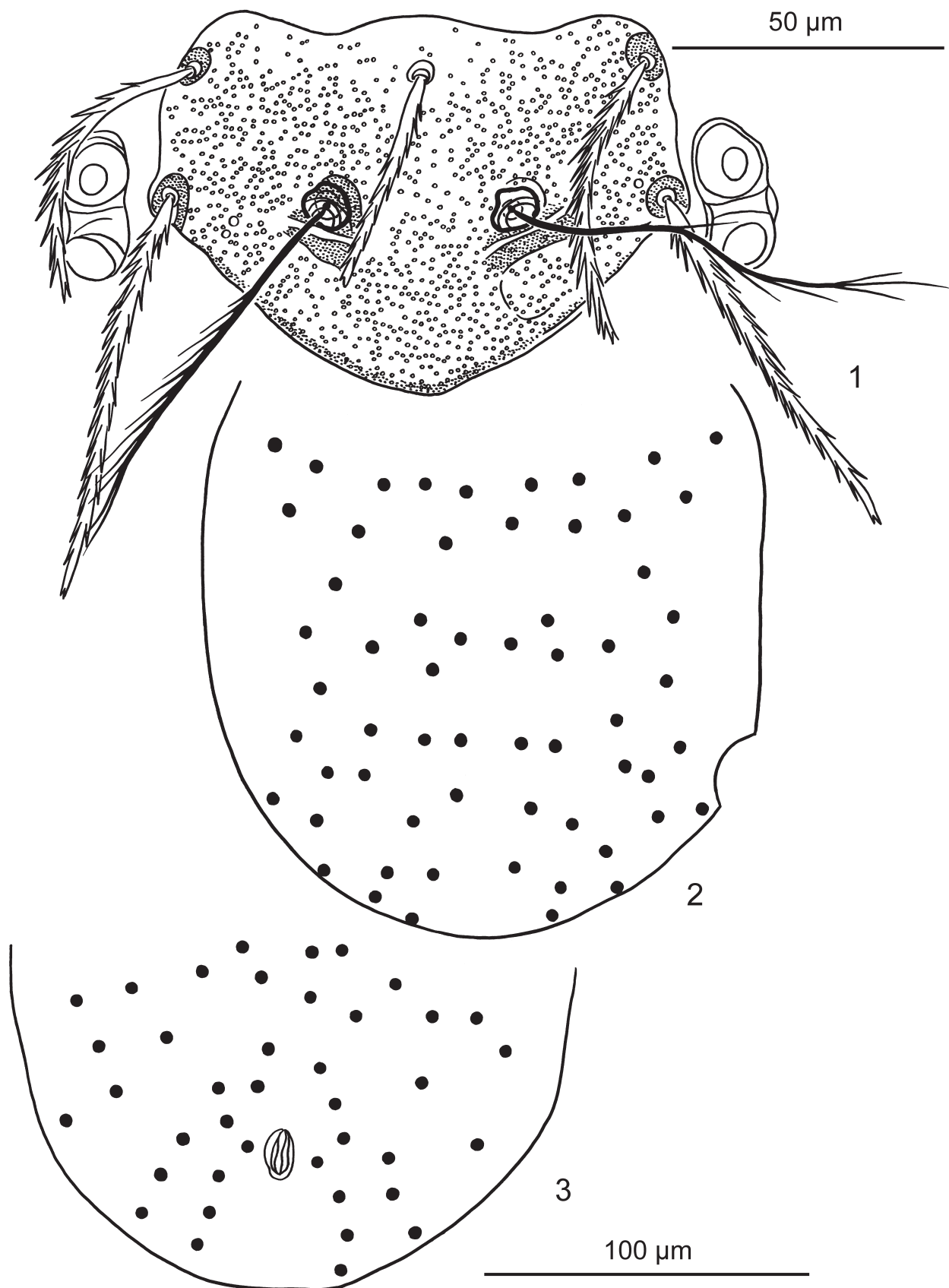


FIGURE 20. *Kepkatrombicula horti*, holotype. 1, scutum and eyes; 2, arrangement of dorsal idiosomal setae; 3, arrangement of ventral idiosomal setae. Scale bars: 50 µm (1), 100 µm (2, 3).

Type material examined. Holotype larva (ZMMU Tdt-356, I-376-4303) from *Meriones hurrianae*, Chabahar, 130 m a.s.l., 21 November 1970, coll. V.M. Neronov.

Hosts. *Meriones hurrianae*, *Acomys dimidiatus*.

Distribution. Iran (Chabahar).

***Microtrombicula traubi* (Muljarskaja and Verdieva, 1974)**

Microtrombidium traubi Muljarskaja and Verdieva, 1974: 77, figs. 1–4.

Microtrombicula traubi Kudryashova 1998: 88, fig. 50

Eltonella grossa: Kudryashova 1976c: 301, figs. 2, 3; Kudryashova *et al.* 1978: 109, fig. 8.

Diagnosis. SIF = 6B-B-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.2.1; fSt = 2.4; fSc: PL > AM > AL; fD = 2H-8-6-6-4-2-2(4); DS = 30–32; VS = 34–46; NDV = 64–78; Ip = 669–696; eyes 1 + 1; ST and pST absent; f₁ anterior to S₁; f₂ slightly posterior to S₂. Measurements of *Eltonella grossa* type series (Kudryashova 1998): AW 38–42, PW 45–50, SB 17–20, ASB 24–25, PSB 20–22, SD 45–47, AP 20–22, AM 28–31, AL 20, PL 31–36, S 42, H 34–36, D_{min} 25, D_{max} 34, V_{min} 17, V_{max} 28, pa 232–249, pm 204–210, pp 230–238. Measurements of *Eltonella grossa* holotype: AW 40, PW 44, SB 19, ASB 20, PSB 23, SD 43, P-PL 18, AP 19, AM 30, AL –, PL 32, H 32, D_{min} 25, D_{max} 31, V_{min} 17, V_{max} 25, pa 221, pm 193, pp 227, Ip 641, TaIIIL 65, TaIIIW 11.

Type material examined. Holotype larva of *Eltonella grossa* (ZMMU Tdt-349, I-367-1122-26) from *Meriones crassus*, Hajiabad, 1900 m a.s.l., 20 August 1969, coll. V.M. Neronov.

Hosts. *Allactaga williamsi*, *Meriones crassus*, *M. persicus*, *Mus musculus*.

Distribution. Azerbaijan, Iran (Ajami, Hajiabad).

***Miyatrombicula nikitini* Kudryashova and Farang-Azad, 1976**

Miyatrombicula nikitini Kudryashova and Farang-Azad, 1976: 926, fig.; Kudryashova *et al.* 1978: 94, fig. 2; Kudryashova 1998: 168, fig. 130.

Diagnosis. SIF = 7BS-N-3-3111.0000; fPp = B/N/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL = AM; fD = 2H-9-12-9-4-2 = 47; DS = 47; VS = 43; NDV = 90; Ip = 829; eyes 2 + 2; PL, dorsal and postanal ventral idiosomal setae lanceolate, with short barbs; f₁ anterior to S₁; f₂ at level or slightly posterior to S₂. Measurements of holotype: AW 70, PW 86, SB 31, ASB 31, PSB 32, SD 63, P-PL 34, AP 24, AM 31, AL 29, PL 32, H 33, D_{min} 25, D_{max} 31, V_{min} 19, V_{max} 27, pa 254, pm 229, pp 266, Ip 749, TaIIIL 77, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-429, I-333-3318) from *Nesokia indica*, Shushtar, 250 m a.s.l., 9 September 1970, coll. A. Farang-Azad.

Host. *Nesokia indica*.

Distribution. Iran (Shushtar).

Remarks. Described from a single specimen.

***Neotrombicula delijani* Kudryashova, 1977**

(Fig. 19)

Neotrombicula delijani Kudryashova, 1977: 57, fig. 8; Kudryashova *et al.* 1978: 133; Stekolnikov 1997: 533, fig. 2; 1998: 229; Stekolnikov & Daniel 2012: 43, fig. 28.

Neotrombicula alexandrae Stekolnikov, 1993: 289, figs. 1, 2.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 2H-6-6-6-6(4)-2(4)-(4); DS = 30; VS = 32; NDV = 62; Ip = 840–843; eyes 2 + 2; f₁ anterior to S₁; f₂ slightly posterior to S₂. Measurements of holotype: AW 72, PW 91, SB 31, ASB 27, PSB 27, SD 54, P-PL 25, AP 28, AM 34, AL 32, PL 45, S 65, H 45, D_{min} 37, D_{max} 45, V_{min} 27, V_{max} 41, pa 272, pm 236, pp 286, Ip 794, TaIIIL 80, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-58, I-158-1787) from *Meriones persicus*, Delijan, edge of a garden on mountain slope, 14 October 1969, coll. V.M. Neronov.

Hosts. *Apodemus agrarius*, *A. ponticus*, *A. uralensis*, *Chionomys gud*, *Ch. nivalis*, *Cricetulus migratorius*, *Meriones persicus*, *Talpa caucasica*.

Distribution. Russia (Volgograd Province, Krasnodarskiy Krai, Adygea, Stavropolskiy Krai, North Ossetia, Dagestan), Turkey, Armenia, Turkmenistan, Iran (Delijan).

Neotrombicula faghihi Kudryashova, 1973

(Fig. 21)

Neotrombicula faghihi Kudryashova, 1973 in: Kudryashova *et al.* 1973a: 130, fig. 1; Kudryashova *et al.* 1978: 129.

Neotrombicula (Iranotrombicula) faghihi: Stekolnikov 2000: 411.

Diagnosis. SIF = 7BS-N-3-2111.1000; fPp = B/B/NbB; fsp = 7.7.7; fCx = 1.1.2; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8(9)-8-6(5)-4-4-2-(2); DS = 34–36; VS = 37–47; NDV = 71–81; Ip = 869–891; eyes 2 + 2; f₁ at level of S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 62–70, PW 78–87, SB 28, ASB 22–25, PSB 31–36, SD 56–61, AP 28–31, AM 28–31, AL 31–36, PL 45–50, H 48–53, D_{min} 34, D_{max} 48, V_{min} 17, V_{max} 42, pa 314–322, pm 255–274, pp 300–305. Measurements of holotype: AW 61, PW 74, SB 29, ASB 24, PSB 35, SD 59, P-PL 24, AP 30, AM 31, AL 35, PL 48, H 48, D_{min} 36, D_{max} 47, V_{min} 23, V_{max} 43, pa 293, pm 243, pp 288, Ip 824, TaIIIL 83, TaIIIW 15.

Type material examined. Holotype larva (ZMMU Tdt-60, I-57-2455) from *Tatera indica*, Chahar Taq, fields of alfalfa, 28 November 1969, coll. V.M. Neronov.

Hosts. *Cricetulus migratorius*, *Tatera indica*.

Distribution. Iran (Chahar Taq).

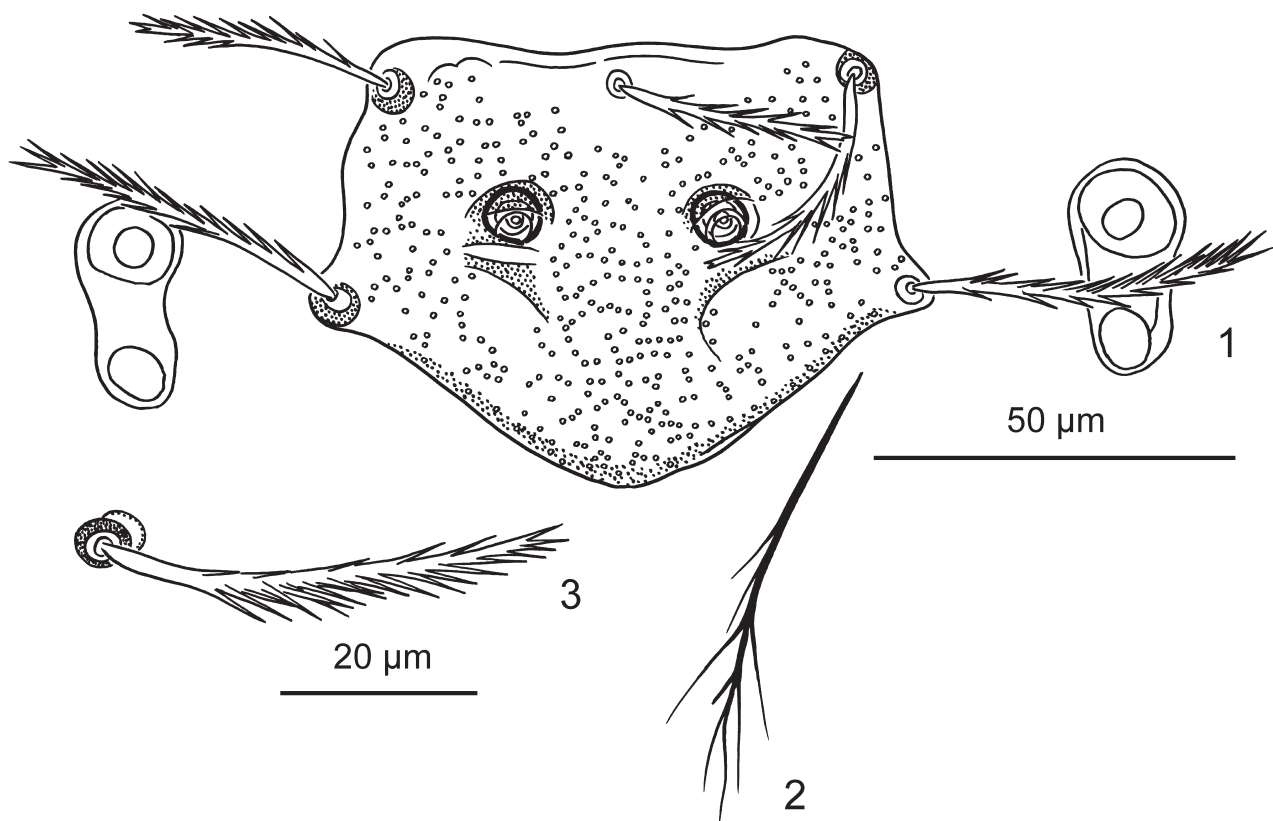


FIGURE 21. *Neotrombicula faghihi*, holotype. 1, scutum and eyes; 2, sensillum; 3, dorsal idiosomal seta of 1st row. Scale bars: 50 µm (1, 2), 20 µm (3).

***Neotrombicula heptneri* Kudryashova, 1973**

Neotrombicula heptneri Kudryashova, 1973 in Kudryashova *et al.* 1973a: 134, fig. 3; Kudryashova *et al.* 1978: 135; Stekolnikov & Kar 2015: 355.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-8-2-4-(4)-2-(2); DS = 32–36; VS = 26–37; NDV = 60–69; Ip = 1019–1131; eyes 2 + 2; f₁ at level of S₁; f₂ posterior to S₂. Measurements of holotype and paratype: AW 79, 81, PW 89, 93, SB 31, 30, ASB 34, 36, PSB 34, 34, SD 68, 70, P-PL 31, 32, AP 33, 33, AM 43, 44, AL 47, 44, PL 72, 75, S 76, 74, H 69, 71, D_{min} 49, 53, D_{max} 64, 68, V_{min} 35, 34, V_{max} 50, 52, pa 414, 409, pm 353, 346, pp 401, 401, Ip 1168, 1156, TaIII 104, 101, TaIIW 19, 18.

Type material examined. Holotype larva (ZMMU Tdt-33, I-65-2159) from *Meriones persicus*, Chehel Zar'i, 1570 m a.s.l., stony slopes of mountains, 26 October 1969, coll. V.M. Neronov; one paratype larva (ZMMU Tdt-34, I-64-2524) from *Meriones libycus*, Fesa, 1130 m a.s.l., 30 November 1969, coll. V.M. Neronov.

Hosts. *Capra hircus*, *Meriones libycus*, *M. persicus*, *Tatera indica*.

Distribution. Iran (Chahar Taq, Chehel Zar'i, Kerman, Mahdishahr), Turkey.

Remarks. Measurements in the original description of this species (Kudryashova *et al.* 1973a) are systematically smaller than our measurements of type specimens (Stekolnikov & Kar 2015). However, in her later work Kudryashova replaced the table of measurements for *N. heptneri* with other values (Kudryashova *et al.* 1978), which do not significantly differ from our results.

***Neotrombicula heterotrichia* Vercammen-Grandjean, Rohde and Mesghali, 1970**

Neotrombicula (Neotrombicula) heterotrichia Vercammen-Grandjean, Rohde and Mesghali, 1970: 774 (synonymy), 776 (description), fig. 1.

Diagnosis. SIF = 7BS-N-3-2111.1000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-4-6-4-2-4-2; DS = 30; VS = 22; NDV = 52; Ip = 922–946; eyes 2 + 2; scutum with anterolateral shoulders and biconvex posterior margin; flagelliform sensilla with 8–11 branches in distal half; f₁ anterior to S₁; f₂ near and slightly posterior to S₂. Measurements of 4 type specimens (Vercammen-Grandjean *et al.* 1970): AW 71–76, PW 82–89, SB 28–29, ASB 32, PSB 23–26, SD 55–58, AP 25–27, AM 33–41, AL 45–48, PL 52–59, S 86–89, H 54–59, D_{min} 38–39, D_{max} 50–54, V_{min} 36–38, V_{max} 40–42, pa 322–328, pm 276–282, pp 324–340, Ip 922–946.

Type material examined. Holotype larva (IUMS) from *Galerida cristata*, Isfahan, 10 April 1967, coll. C.J. Rohde.

Hosts. *Galerida cristata*, *Lepus europaeus*.

Distribution. Iran (Bandar Abbas, Isfahan).

***Neotrombicula kermani* Kudryashova, 1977**

Neotrombicula kermani Kudryashova, 1977: 52, fig. 4; Kudryashova *et al.* 1978: 130.

Diagnosis. SIF = 7BS-B-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8-10-8(9)-6-6(4)-2(4); DS = 42–43; VS = 47–49; NDV = 91–92; Ip = 969–1005; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 76–81, PW 95–104, SB 34–36, ASB 34–36, PSB 28–32, SD 62–67, AP 31–34, AM 39–42, AL 48, PL 62–73, S 81, H 64–73, D_{min} 42–50, D_{max} 56–62, V_{min} 31, V_{max} 50–53, pa 333–342, pm 294–305, pp 339–361. Measurements of holotype: AW 79, PW 99, SB 34, ASB 36, PSB 32, SD 68, P-PL 29, AP 33, AM 40, AL 46, PL 65, H 71, D_{min} 52, D_{max} 65, V_{min} 34, V_{max} 52, pa 297, pm 247, pp 315, Ip 859.

Type material examined. Holotype larva (ZMMU Tdt-54, I-146-4481) from *Meriones persicus*, Kerman, 2220 m a.s.l., 11 December 1970, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Kerman).

***Neotrombicula mofidii* Kudryashova, 1973**

(Fig. 22)

Neotrombicula mofidii Kudryashova, 1973 in Kudryashova *et al.* 1973a: 132, fig. 2; Kudryashova *et al.* 1978: 134.

Neotrombicula (Neotrombicula) mofidi (sic): Kudryashova 1998: 210.

Neotrombicula (Iranotrombicula) mofidi (sic): Stekolnikov 2000: 411.

Neotrombicula mofidi (sic): Kudryashova 2004: 26.

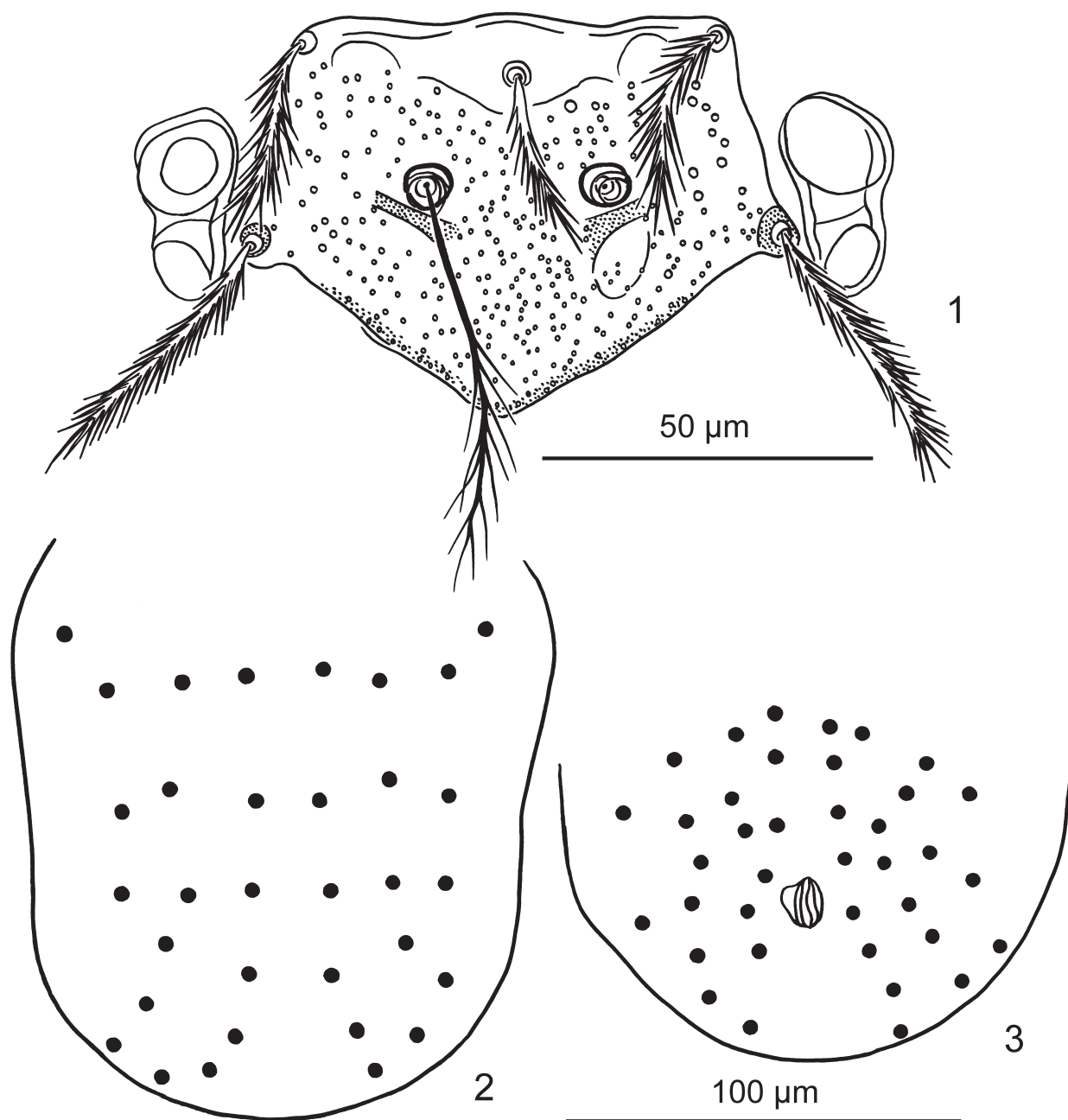


FIGURE 22. *Neotrombicula mofidii*, holotype. **1**, scutum and eyes; **2**, arrangement of dorsal idiosomal setae; **3**, arrangement of ventral idiosomal setae. Scale bars: 50 µm (**1**), 100 µm (**2**, **3**).

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6(7)-6-4(6)-4-2(2); DS = 30–34; VS = 30–42; NDV = 60–73; Ip = 813–863; eyes 2 + 2; f₁ at level of S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 59–64, PW 78–84, SB 25–28, ASB 22–28, PSB 31–39, SD 56–62, AP 28–31, AM 20–28, AL 28–34, PL 42–48, S 56–62, H 39–45, D_{min} 31, D_{max} 42, V_{min} 20, V_{max} 36, pa 283–300, pm 244–258, pp 283–308. Measurements of holotype: AW 63, PW 79, SB 27, ASB 25, PSB 34, SD 59, P-PL 27, AP 31, AM 27, AL 31, PL 40, S 58, H 41, D_{min} 33, D_{max} 43, V_{min} 28, V_{max} 34, pa 290, pm 248, pp 284, Ip 822, TaIIIL 85, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-66, I-76-1786) from *Meriones persicus*, Delijan, 1600 m a.s.l., 14 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Azerbaijan, Iran (Delijan).

***Neotrombicula nivalis* Kudryashova, 1977**

Neotrombicula nivalis Kudryashova, 1977: 52, fig. 5; Kudryashova *et al.* 1978: 131; Stekolnikov 1997: 540.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/NBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-6-6-4-6-4-2; DS = 30; VS = 31–36; NDV = 61–66; Ip = 938–991; eyes 2 + 2; f₁ slightly anterior to S₁; f₂ far posterior to S₂. Measurements of two paratypes: AW 76, 74, PW 86, 86, SB 28, 29, ASB 31, 30, PSB 27, 29, SD 58, 59, P-PL 23, 20, AP 29, 32, AM 36, –, AL 41, 45, PL 61, 63, H 54, 59, D_{min} 45, 45, D_{max} 54, 54, V_{min} 32, 39, V_{max} 48, 54, pa 322, 310, pm 263, 265, pp 328, 320, Ip 913, 895, TaIIIL 92, 94, TaIIIW 20, 16.

Type material examined. Holotype larva (ZMMU Tdt-98, I-395-3842-43, not suitable for examination) from *Chionomys* sp., Mashhad 2, 1100 m a.s.l., 15–19 October 1970; two paratype larvae (ZMMU Tdt-100, I-397-3842-43; Tdt-99, I-396-3842-43) with same data.

Hosts. *Chionomys* sp., *Cricetulus migratorius*.

Distribution. Iran (Mashhad 2).

***Neotrombicula rara* Kudryashova, 1977**

Neotrombicula rara Kudryashova, 1977: 54, fig. 6; Kudryashova *et al.* 1978: 132.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8(9)-8-8-8-6(4)-4(2)-2; DS = 43–46; VS = 46–50; NDV = 91–93; Ip = 969–999; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 73–81, PW 87–95, SB 31–34, ASB 28–31, PSB 25–28, SD 56–59, AP 28–31, AM 34–39, AL 36–42, PL 50–56, H 53–59, D_{min} 36–39, D_{max} 50–56, V_{min} 28, V_{max} 36–42, pa 339–347, pm 286–302, pp 342–350. Measurements of paratype: AW 76, PW 93, SB 34, ASB 31, PSB 28, SD 59, P-PL 25, AP 31, AM 34, AL 36, PL 52, H 52, D_{min} 43, D_{max} 52, V_{min} 29, V_{max} 43, pa 331, pm 284, pp 281, Ip 896, TaIIIL 94, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-85, I-150-3678, not suitable for examination) from *Meriones persicus*, Mahdishahr, 1850 m a.s.l., 6–8 October 1970, coll. V.M. Neronov; paratype larva (ZMMU Tdt-86, I-152-3696) with same data.

Hosts. *Meriones persicus*, *Calomyscus* sp.

Distribution. Iran (Mahdishahr).

***Neotrombicula rostrata* Muljarskaja, 1973**

(Fig. 23)

Neotrombicula rostrata Muljarskaja, 1973: 312, fig. 1; Kudryashova *et al.* 1978: 137, fig. 15.

Neotrombicula (*Neotrombicula*) *rostrata*: Kudryashova 1998: 212, fig. 172.

Diagnosis. SIF = 7BS-N-3-3111.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: AM \geq PL > AL; fD = 2H-8-8-2-8-6-4-2; DS = 38–44; VS = 37–44; NDV = 78; Ip = 767–841; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of 11 Iranian specimens (Kudryashova 1998): AW 73–84, PW 95–101, SB 34–39, ASB 28–34, PSB 25–31, SD 56–62, AP 28–31, AM 62–70, AL 42–50, PL 62–73, S 84–87, H 59–70, D_{min} 48, D_{max} 67, V_{min} 31, V_{max} 56, pa 249–274, pm 238–263, pp 280–305. Measurements of paratype: AW 75, PW 95, SB 33, ASB 30, PSB 29, SD 59, P-PL 31, AP 26, AM 63, AL 49, PL 65, H 65, D_{min} 48, D_{max} 56, V_{min} 35, V_{max} 49, pa 263, pm 247, pp 284, Ip 794, TaIIIL 70, TaIIIW 22.

Type material examined. Paratype larva (ZMMU Tdt-2773, N-55895) from *Crocidura russula*, Azerbaijan, Archivan village, 5 March 1965, coll. N.V. Chirkova.

Additional material examined. One larva (ZMMU Tdt-97) from *Apodemus sylvaticus*, Iran, 15 km E Chalus, deciduous forests along the Caspian Sea shore, 13 June 1969, coll. V.M. Neronov).

Hosts. *Apodemus sylvaticus*, *A. uralensis*, *Crocidura russula*, *Microtus schelkovnikovi*, *M. socialis*.

Distribution. Azerbaijan, Iran (Chalus).

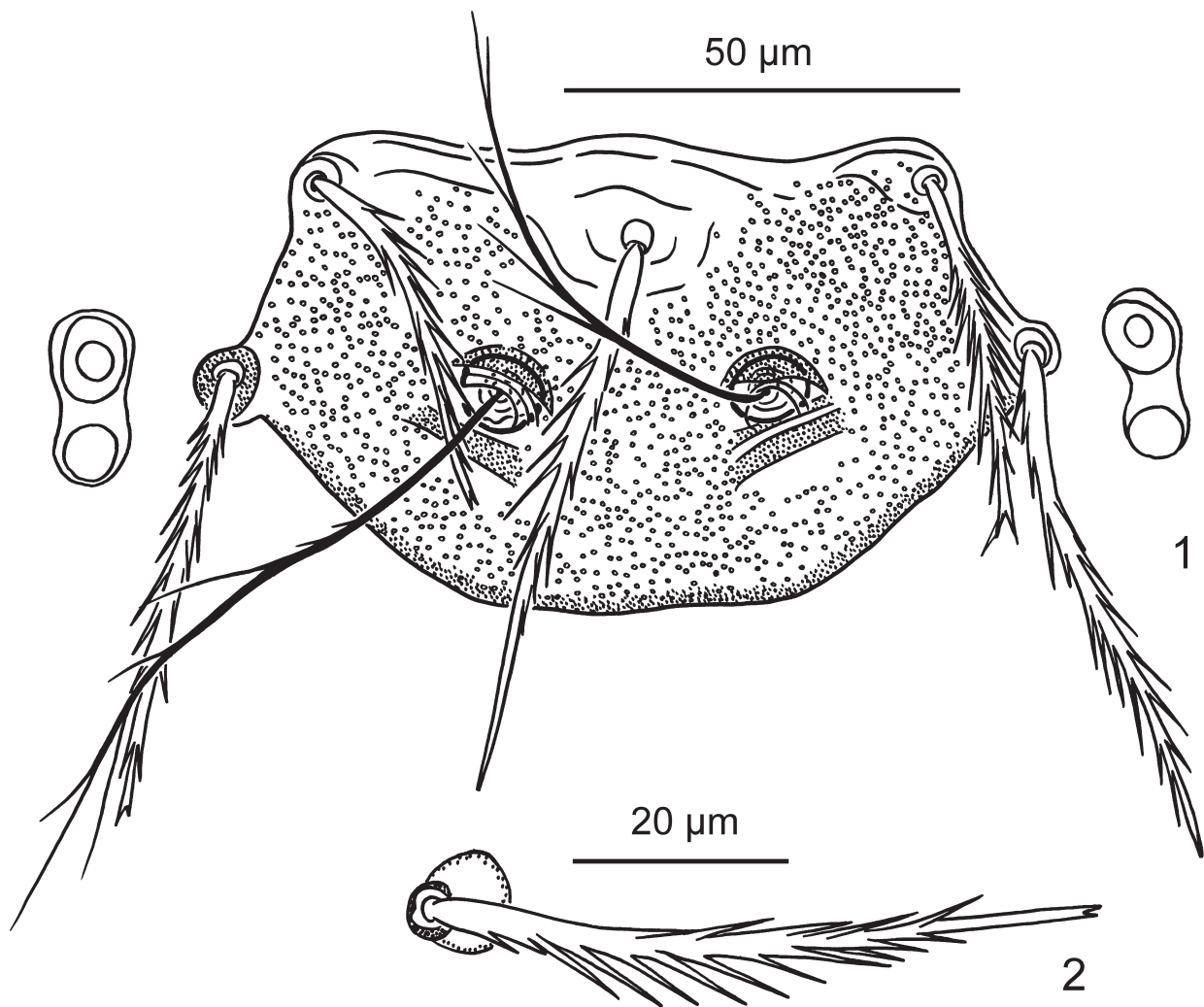


FIGURE 23. *Neotrombicula rostrata*. 1, scutum and eyes; 2, dorsal idiosomal seta of 1st row. Scale bars: 50 µm (1), 20 µm (2).

Neotrombicula sabzavari Kudryashova, 1977

(Fig. 24)

Neotrombicula sabzavari Kudryashova, 1977: 50, fig. 3; Kudryashova *et al.* 1978: 50, fig. 3.

Neotrombicula (Iranotrombicula) sabzavari: Stekolnikov 2000: 411.

Diagnosis. SIF=7BS-B-3-2111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.2; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-7(8)-8-8(9)-6(8)-4(6)-2(6)-(4-6); DS = 44-52; VS = 40-54; NDV = 84-108; Ip = 873-907; eyes 2 + 2; f₁ at level of S₁; f₂ posterior to S₂; mastitarsala with 2-3 cilia in basal part. Measurements of type series (Kudryashova *et al.* 1978): AW 62-67, PW 81-84, SB 22-26, ASB 24-25, PSB 28-29, SD 53, AP 28, AM 28, AL 31-34, PL 48-50, S 64-70, H 45-48, D_{min} 31-34, D_{max} 42-45, V_{min} 25, V_{max} 34, pa 308-319, pm 260-272, pp 305-316. Measurements of holotype: AW 65, PW 81, SB 24, ASB 24, PSB 27, SD 51, P-PL 23, AP 27, AM 26, AL 27, PL 46, S 63, H 46, D_{min} 29, D_{max} 41, V_{min} 25, V_{max} 37, pa 279, pm 232, pp 279, Ip 790, TaIIIL 83.

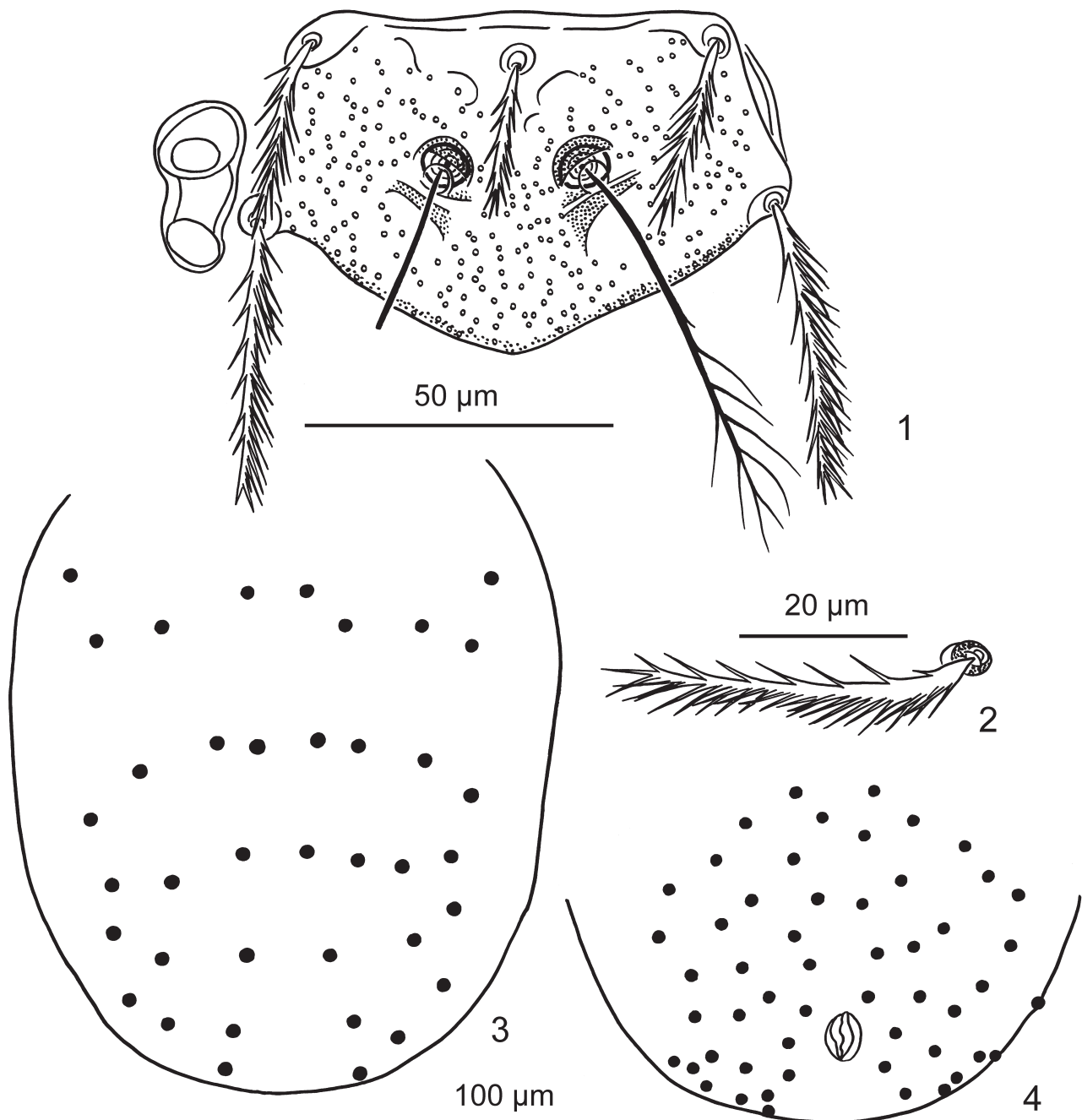


FIGURE 24. *Neotrombicula sabzavari*, paratype. 1, scutum and eyes; 2, dorsal idiosomal seta of 1st row; 3, arrangement of dorsal idiosomal setae; 4, arrangement of ventral idiosomal setae. Scale bars: 50 µm (1), 20 µm (2), 100 µm (3, 4).

Type material examined. Holotype larva (ZMMU Tdt-91, I-391-3755) from *Meriones libycus*, Kabudan, 1200 m a.s.l., 9–14 October 1970, coll. V.M. Neronov; paratype larva (ZMMU I-389-3757) with same data.

Host. *Meriones libycus*.

Distribution. Iran (Kabudan).

***Neotrombicula talmiensis* (Schluger, 1955)**

Trombicula talmiensis Schluger, 1955: 212, fig. 359.

Neotrombicula talmiensis: Kudryashova *et al.* 1978: 139; Stekolnikov 1996: 380, fig. 1; 2001a: 506.

Neotrombicula (Neotrombicula) talmiensis: Kudryashova 1998: 185, fig. 143.

Diagnosis. SIF = 7BS-B-3-3111.1000; fPp = B/B/N(B)BB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM ≥ AL; fD = 2H-8-6-6-4-6-2, 2H-6-6-6-4-4-2; DS = 30–36; VS = 27–36; NDV = 59–70; Ip = 835–929; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements of 14 Iranian specimens (Stekolnikov 2001a): AW 69–78, PW 84–92, SB 30–34, ASB 29–36, PSB 23–29, SD 52–63, P-PL 25–31, AP 23–29, AM 43–48, AL 40–47, PL 61–68, H 59–69, D_{min} 43–49, D_{max} 54–60, Ip 877–981, TaIIIL 79–90.

Type data. Syntypes larvae (ZMMU), Russia, Primorsky Krai, Talmi Lake.

Hosts. Rodents, soricomorphs, birds; occasionally on humans and dogs.

Distribution. Eurasia, from Italia to Korea. Localities in Iran: Behbahan, Kazerun 2, Urmia, Zarrin Shahr.

***Neotrombicula valenti* Kudryashova, 1973**

(Fig. 25)

Neotrombicula valenti Kudryashova, 1973 in Kudryashova *et al.* 1973a: 134, fig. 4; Kudryashova *et al.* 1978: 136.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/NBB; fsp = 7.7.7; fCx = 1.2.2; fSt = 2.2; fSc: PL > AL > AM; fD = 2H-14(11–13)-10(11–12)-12(10–14)...; DS = 47–61; VS = 40–58; NDV = 97–115; Ip = 1158–1241; eyes 2 + 2; f₁ slightly anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 79–83, PW 89–99, SB 30–33, ASB 39–43, PSB 30–36, SD 73–76, AP 30–36, AM 40–50, AL 50–56, PL 63–73, S 82–96, H 63–76, D_{min} 40, D_{max} 66, V_{min} 30, V_{max} 50, pa 403–436, pm 353–380, pp 403–432. Measurements of holotype: AW 80, PW 90, SB 32, ASB 38, PSB 32, SD 70, P-PL 31, AP 31, AM 44, AL 50, PL 67, S 95, H 68, D_{min} 44, D_{max} 58, V_{min} 34, V_{max} 53, pa 398, pm 344, pp 398, Ip 1140, TaIIIL 124, TaIIIW 22.

Type material examined. Holotype larva (ZMMU Tdt-104, I-47-2497) from *Meriones libycus*, Chahar Taq, 1000–1500 m a.s.l., sandy terraces with bush of tamarisk and stones along the river; alfalfa fields, 30 November 1969, coll. V.M. Neronov; paratype larva (I-51-2524) with same data.

Hosts. *Cricetulus migratorius*, *Gerbillus nanus*, *Meriones libycus*, *M. persicus*, *Mus musculus*.

Distribution. Iran (Chahar Taq, Kerman).

***Neotrombicula valeri* Kudryashova, 1977**

(Fig. 26)

Neotrombicula valeri Kudryashova, 1977: 47, fig. 1; Kudryashova *et al.* 1978: 125.

Diagnosis. SIF = 7BS-N-3-2(3)111.1000; fPp = B/B/NbB; fSp = 7.7.7; fCx = 1.1.1(2); fSt = 2.2; fSc: PL > AL > AM; fD = 2H-8-4-10-11-6-5; DS = 46–58; VS = 44–51; NDV = 93–110; Ip = 984–1042; eyes 2 + 2; f₁ at level or slightly anterior to S₁; f₂ posterior to S₂. Measurements of type series (Kudryashova *et al.* 1978): AW 73–81, PW 95–105, SB 31–35, ASB 31–34, PSB 30–36, SD 62–67, AP 30–34, AM 36–39, AL 42, PL 56–62, S 84, H 56–59, D_{min} 36, D_{max} 56, V_{min} 28, V_{max} 48, pa 342–367, pm 291–316, pp 342–372. Measurements of holotype: AW 74, PW 95, SB 32, ASB 29, PSB 33, SD 62, P-PL 32, AP 30, AM 36, AL 40, PL 57, S 85, H 55, D_{min} 41, D_{max} 49, V_{min} 28, V_{max} 54, pa 315, pm 263, pp 310, Ip 888, TaIIIL 92, TaIIIW 16.

Type material examined. Holotype larva (ZMMU Tdt-129, I-160-3842-43) from *Chionomys nivalis*, Mashhad 2, 1100 m a.s.l., 15–19 October 1970, coll. V.M. Neronov.

Hosts. *Apodemus sylvaticus*, *Chionomys nivalis*, *Cricetulus migratorius*.

Distribution. Iran (Mashhad 2).

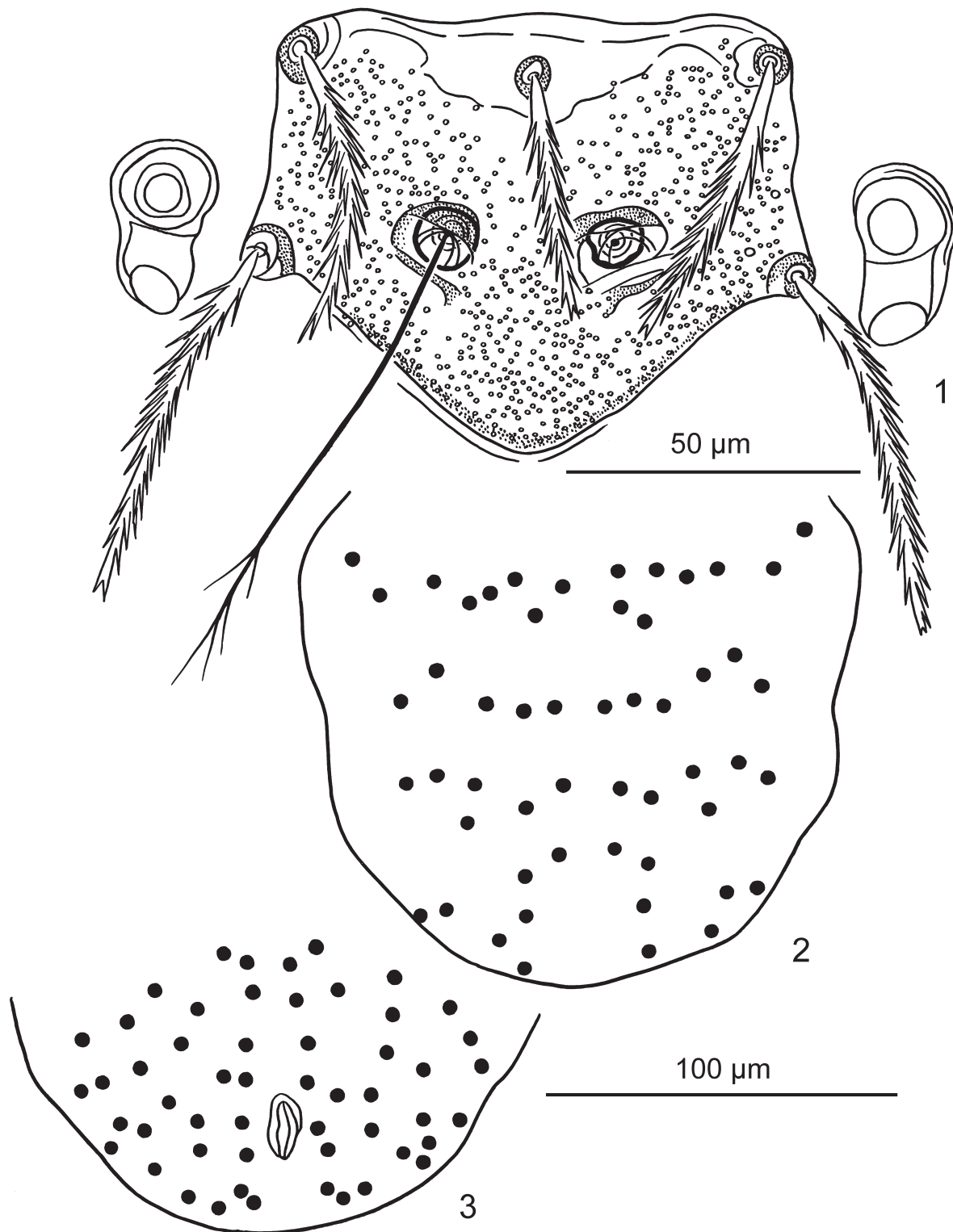


FIGURE 25. *Neotrombicula valenti*, paratype. 1, scutum and eyes; 2, arrangement of dorsal idiosomal setae; 3, arrangement of ventral idiosomal setae. Scale bars: 50 µm (1), 100 µm (2, 3).

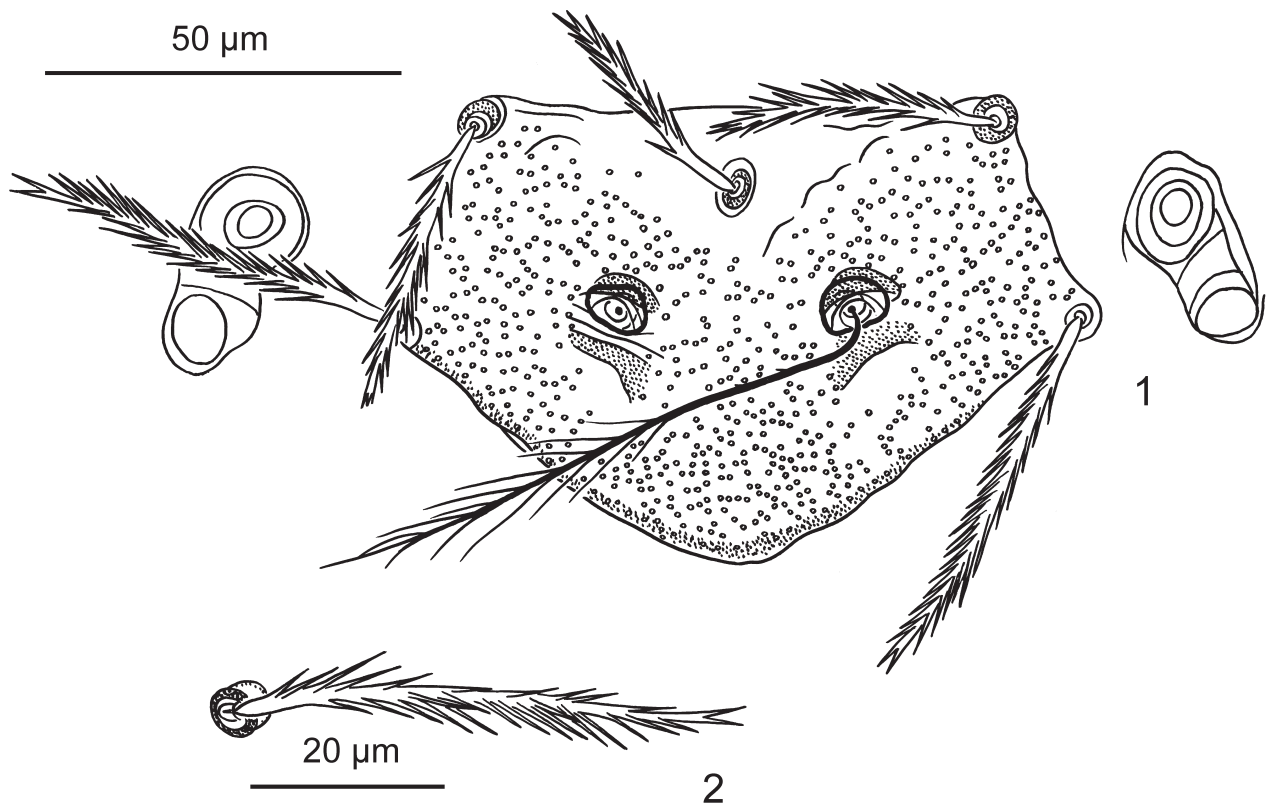


FIGURE 26. *Neotrombicula valeri*, holotype. 1, scutum and eyes; 2, dorsal idiosomal seta of 1st row. Scale bars: 50 µm (1), 20 µm (2).

Neotrombicula vulgaris (Schluger, 1955)

Trombicula vulgaris Schluger, 1955: 213, fig. 362.

Neotrombicula vulgaris: Kudryashova *et al.* 1978: 126, fig. 14; Stekolnikov 1999: 389.

Neotrombicula (Neotrombicula) vulgaris: Kudryashova 1998: 203, fig. 161.

Diagnosis. SIF = 7BS-N-3-3111.1000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL > AM > AL; fD = 4H-8(10)-10(13)-8(9)-8(7)-4-6; DS = 43–63; VS = 24–37; NDV = 72–95; Ip = 725–916; eyes 2 + 2; f₁ anterior to S₁; f₂ posterior to S₂. Measurements (Stekolnikov 1999): AW 72–86, PW 90–104, SB 31–40, ASB 26–32, PSB 25–32, SD 54–63, P-PL 21–31, AP 25–34, AM 40–57, AL 38–49, PL 47–68, S 68–90, H 47–67, D_{min} 37, D_{max} 63, V_{min} 25, V_{max} 61, pa 241–326, pm 220–281, pp 256–324, Ip 725–916, TaIII 58–83, TaIIW 14–18.

Type data. Syntypes larvae (ZMMU Tdt-2356-2359), Russia, Stavropol Krai, Alexandrovskoe Village, coll. V.P. Petrov.

Hosts. Twelve species of rodents (Stekolnikov, 1999).

Distribution. Hungary, Bulgaria, Moldova, Ukraine, Poland, Russia (Stavropol Krai, Krasnodar Krai, North Ossetia), Georgia, Azerbaijan, Turkey, Iran (Mashhad 2), Turkmenistan, Israel, China (dubious record).

Otorhinophila deserta Kudryashova, Neronov and Mobedi, 1972

(Fig. 14)

Otorhinophila (Danielia) deserta Kudryashova, Neronov and Mobedi, 1972: 1078, fig. 1; Kudryashova *et al.* 1978: 96.

Diagnosis. SIF = 5B-B-3-2111.0000; fPp = B/B/BBB; fsp = 7.7.7; fSt = 2.6(5–7); fCx = 1.1.6(5–8); fSc: PL > AM

\geq AL; fD = 6H-5-8-8-6-7-10-4-9-12-8-6-6; DS = 94–112; VS = 62–84; NDV=169; Ip = 1003–1062; eyes 1 + 1; PLs extrascutal; pST absent; 2 tibialae I and microtibiala apical; f_1 slightly posterior to S_1 ; 2 tibialae II apical; f_2 at level of S_2 . Measurements of type series (Kudryashova *et al.* 1978): AW 59–66, SB 36–40, ASB 33–36, PSB 13–20, SD 46–53, AM 30–36, AL 23–33, PL 36–43, S 56–76, H 35–40, D_{\min} 23, D_{\max} 33, V_{\min} 20, V_{\max} 33, pa 346–373, pm 304–327, pp 350–376. Measurements of holotype: AW 62, PW 90, SB 38, ASB 32, PSB 20, SD 52, P-PL 16, AP 33, AM 36, AL 26, PL 37, H 36, D_{\min} 23, D_{\max} 36, V_{\min} 22, V_{\max} 32, pa 351, pm 311, pp 356, Ip 1018, TaIIIL 101, TaIIIW 22.

Type material examined. Holotype larva (ZMMU Tdt-18, I-17-2134) from *Meriones persicus*, Chehel Zar'i, 1570 m a.s.l. (stony slopes of mountains), 26 October 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Behbahan, Chehel Zar'i).

***Otorhinophila farhangazadi* Kudryashova, Neronov and Mobedi, 1972**

Otorhinophila (Danielia) farhangazadi Kudryashova, Neronov and Mobedi, 1972: 1080, fig. 2; Kudryashova *et al.* 1978: 97.

Diagnosis. SIF = 5B-B-3-2110.0000; fPp = B/B/BBB; fsp = 7.7.7; fSt=2.4(5); fCx = 1.1.5(4–7); fSc: PL > AM > AL; fD = 4H-4-8-6-6-10-10-6-4-6; DS = 56–67; VS = 50–65; NDV=114; Ip = 911–977; eyes 1 + 1; PLs extrascutal; ST and pST absent; f_1 slightly posterior to S_1 ; f_2 at level of S_2 . Measurements of type series (Kudryashova *et al.* 1978): AW 46–56, SB 26–33, ASB 30–33, PSB 13–17, SD 43–46, AM 30–33, AL 23–26, PL 33–43, S 56–73, H 33–40, D_{\min} 23, D_{\max} 36, V_{\min} 16, V_{\max} 30, pa 310–347, pm 274–294, pp 310–337. Measurements of holotype: AW 49, PW 68, SB 28, ASB 29, PSB 15, SD 44, P-PL 11, AP 29, AM 29, AL 23, PL 34, H 38, D_{\min} 29, D_{\max} 38, V_{\min} 19, V_{\max} 42, pa 299, pm 257, pp 317, Ip 873, TaIIIL 97, TaIIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-1, I-28-2444) from *Meriones persicus*, Behbahan, 320 m a.s.l., slope near the river bank with single trees and stones, 20 November 1969, coll. V.M. Neronov.

Host. *Meriones persicus*.

Distribution. Iran (Behbahan, Borazjan, Chahar Taq).

***Pentidionis agamae* (Andr, 1929)**

Thrombicula agamae André, 1929: 402, figs. 1–2.

Thrombicula (Eutrombicula) agamae, Thor & Willmann 1947: 286.

Trombicula (Trombicula) agamae, Wharton & Fuller 1952: 62.

Hexidionis (Pentidionis) agamae, Vercammen-Grandjean & Loomis 1967: 140; Vercammen-Grandjean *et al.* 1970: 774 (synonymy), fig. 2.

Pentidionis agamae, Lucas & Loomis 1968: 233.

Diagnosis. SIF = 7B-B-3-3111.1000; fPp = B/B/NBB; fsp = 7.7.7; fSt=2.4; fCx = 1.1.1; fSc: PL \geq AM > AL; fD = 4H-8-6-6-4-4-4; DS = 34; VS = 32; NDV = 66; Ip = 900–958; eyes 2 + 2; scutum with prominent rounded posterior margin, flagelliform sensilla branched in distal half; pST nude or branched; 2 basal and 1 distal genualae I; f_1 anterior to S_1 ; f_2 anterior to apically inflated S_2 ; onychotriches present; mastitarsala ciliated. Measurements of Israeli and Iranian specimens (Vercammen-Grandjean *et al.* 1970): AW 55–57, PW 66–68, SB 19–21, ASB 21–23, PSB 19–23, SD 40–46, AP 14–17, AM 28–30, AL 19–24, PL 30–34, S 60–66, H 32–35, D_{\min} 21–27, D_{\max} 31–35, V_{\min} 23–29, V_{\max} 27–32, pa 306–324, pm 272–294, pp 322–340, Ip 900–958.

Type data. Holotype larva in Muséum national d'Histoire naturelle, Paris, France (Wharton & Fuller 1952).

Hosts. *Agama stellio* (type host), *Agama* sp.

Distribution. Israel, Iran (Kazerun).

Willmannium aelleni (Vercammen-Grandjean, 1963)

Leptotrombidium (*Cotrombidium*) *aelleni* Vercammen-Grandjean, 1963: 585, Pl. 1.

Toritrombicula (*Cotrombidium*) *aelleni*: Vercammen-Grandjean & Langston 1971: 448.

Chiroptella (*Willmannium*) *aelleni*: Vercammen-Grandjean & Langston 1976: 906, Pl. 252.

Willmannium aelleni: Kudryashova 1992: 35, fig. 2; 1998: 141, fig. 101.

Chiroptella (*Oudemansidium*) *mozdorani* Kudryashova, 1975: 1563, fig. 2; Kudryashova *et al.* 1978: 123, fig. 13.

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = N/N/NNN; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL ≥ AM > AL; fD = 2H-10(9)-2-8(6)-2(3)-8(7)-7(4)-6(4)-2-2(4); DS = 44–55; VS = 46–51; NDV = 90–104; Ip = 966–1027; eyes 2 + 2; f₁ anterior to S₁; f₂ anterior or posterior to S₂. Measurements of *Chiroptella mozdorani* type series (Kudryashova *et al.* 1978): AW 62–64, PW 70–73, SB 27–28, ASB 31–34, PSB 11, SD 42–45, AP 34, AM 45–48, AL 34–36, PL 45–50, S 70, H 42–48, D_{min} 31, D_{max} 50, V_{min} 20, V_{max} 42, pa 342–356, pm 311–319, pp 333–350. Measurements of *Chiroptella mozdorani* holotype: AW 63, PW 71, SB 26, ASB 34, PSB 13, SD 47, P-PL 6, AP 35, AM 49, AL 38, PL 54, H 49, D_{min} 31, D_{max} 50, V_{min} 25, V_{max} 45, pa 340, pm 311, pp 333, Ip 984, TaIII 97, TaIIW 18.

Type data. Holotype larva of *Leptotrombidium aelleni* (Lund Museum of Zoology, Sweden).

Type material examined. Holotype larva of *Chiroptella* (*Oudemansidium*) *mozdorani* (ZMMU Tdt-703, I-42-1027-30) from *Rhinolophus ferrumequinum*, Mozdorran cave, 1400 m a.s.l., 29 July 1969, coll. V.M. Neronov.

Hosts. *Barbastella leucomelas*, *Myotis blythii*, *Rhinolophus ferrumequinum*.

Distribution. Afghanistan, Iran (Mozdorran cave), Kyrgyzstan.

Willmannium cavus iraniensis Kudryashova, 1992

Willmannium cavus iraniensis Kudryashova, 1992: 43, fig. 6 (1–4); 1998: 146, fig. 106.

Chiroptella (*Oudemansidium*) *aelleni*: Kudryashova *et al.* 1978: 122, fig. 12 (misidentification).

Diagnosis. SIF = 7BS-B-3-2111.0000; fPp = N/N/NNN; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fSc: PL ≥ AM > AL; fD = 2H-[8-3]-[7-1]-8-[6-1]-5-4; DS = 45; VS = 38; NDV = 83; Ip = 896–923; eyes 2 + 2; f₁ anterior to S₁; f₂ slightly anterior to S₂. Measurements of holotype: AW 61, PW 76, SB 27, ASB 31, PSB 16, SD 47, P-PL 7, AP 35, AM 41, AL 33, PL 47, H 48, D_{min} 30, D_{max} 45, V_{min} 23, V_{max} 43, pa 292, pm 256, pp 295, Ip 843, TaIII 86, TaIIW 14.

Type material examined. Holotype larva (ZMMU Tdt-713, I-40-704) from *Eptesicus bottae egnevi*, Chelmir, above a brook in the mountain gorge, 1000 m a.s.l., 16 July 1969, coll. V.M. Neronov.

Host. *Eptesicus bottae egnevi*.

Distribution. Iran (Chelmir).

Bias between our and original measurements

A direct comparison of our measurements of holotypes with those from original descriptions published by Kudryashova shows that usually the difference constitutes a few micrometres for all metric variables except the legs' lengths—the latter are significantly larger for Kudryashova's data in most cases (Supplement). The Sign test (Table 2) and the Wilcoxon Matched Pairs test (Table 3) statistically confirm that observation. While the difference between all measurements of legs (pa, pm, pp, Ip) is significant at high level of confidence according both tests, only a few other variables reveal a statistically significant (or at least close to the threshold value of confidence) dissimilarity. Therefore, the supposition of a systematic bias between our and Kudryashova's metric data (for example, due to an inappropriate calibration of the ocular micrometer) is not confirmed. Note that original measurements of *Neotrombicula heptneri* were systematically lesser as compared with the new ones (Stekolnikov & Kar 2015), probably, due to an accidental error, since they were corrected later (Kudryashova *et al.* 1978).

The statistically significant discrepancies in the values of some variables, including legs' lengths, can be explained by peculiar properties in the mode of measuring performed by two researchers (Kudryashova and Stekolnikov) for several morphological structures. In the case of legs' lengths, the difference could be caused by inclusion or exclusion of the proximal part of coxa, tip of tarsus, and claws, and by unequal way of the taking into account the leg's curvature (Fig. 27). Although that difference is rather big, statistically significant, and could be estimated as systematic, its range is highly variable—so that there are six cases when legs' lengths after

Stekolnikov are longer than those after Kudryashova (Fig. 28). Therefore, we cannot recommend using a correction coefficient to fix that bias. However, the fact of that discrepancy should be taken into account during chigger studies to estimate the taxonomic significance of the data on legs' lengths.

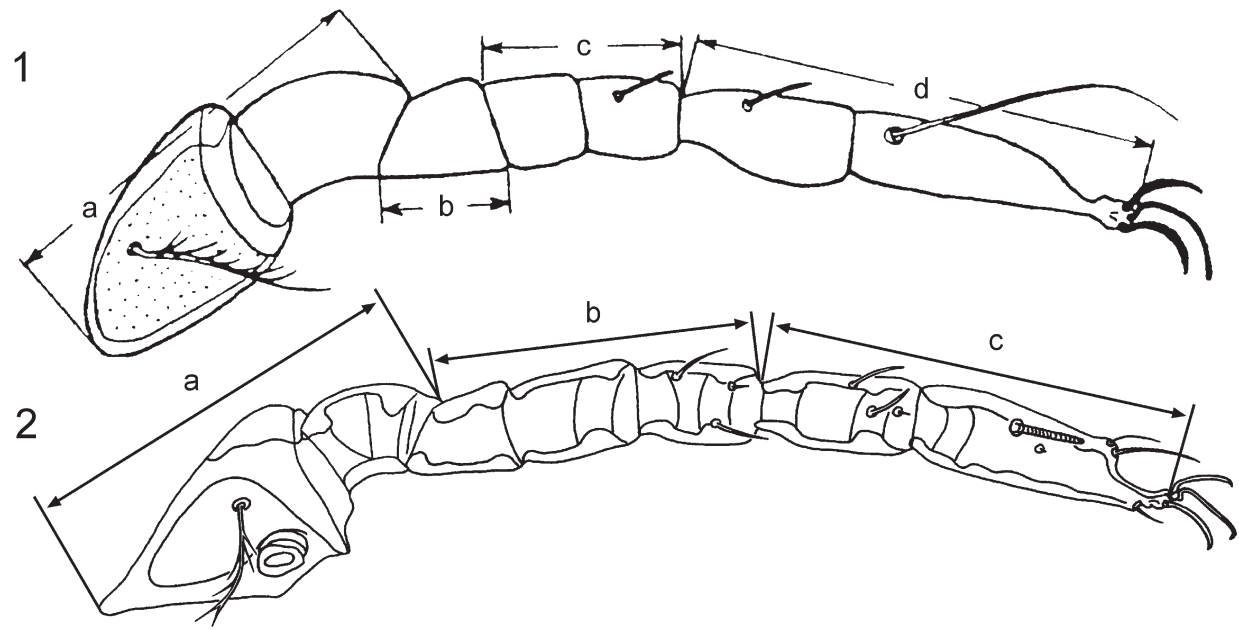


FIGURE 27. Mode of leg measuring. 1, after Kudryashova (1998, Fig. 4); 2, after Stekolnikov (2013, Fig. 2).

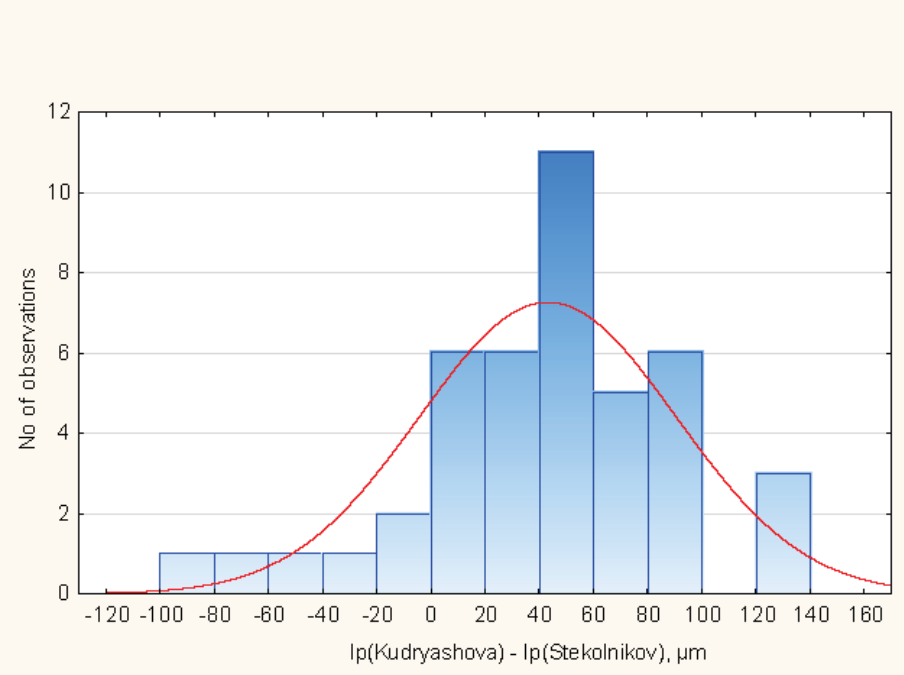


FIGURE 28. Histogram of the odds between sums of legs' lengths (Ip) for holotypes.

TABLE 2. Sign test for the difference between holotypes' measurements.

Variable	No. of Non-ties	Percent $v < V$	Z	p-value
AW	36	50.00	-0.1667	0.867632
PW	35	65.71	1.6903	0.090969
SB	32	75.00	2.6517	0.008010
ASB	35	65.71	1.6903	0.090969
PSB	39	38.46	1.2810	0.200185
SD	37	56.76	0.6576	0.510798
AP	32	37.50	1.2374	0.215925
AM	32	40.63	0.8839	0.376759
AL	36	61.11	1.1667	0.243345
PL	36	58.33	0.8333	0.404657
S	12	33.33	0.8660	0.386476
H	33	45.45	0.3482	0.727724
D _{min}	36	33.33	1.8333	0.066753
D _{max}	37	35.14	1.6440	0.100178
V _{min}	35	34.29	1.6903	0.090969
V _{max}	38	36.84	1.4600	0.144292
pa	43	79.07	3.6600	0.000252
pm	41	87.80	4.6852	0.000003
pp	43	86.05	4.5750	0.000005
Ip	43	86.05	4.5750	0.000005

Note: Tests significant at $p < 0.05$ are marked in bold.

Discussion

Considering a large variety of natural conditions in Iran, we must note that 85 chigger species recorded hitherto cannot exhaust the Iranian fauna of these mites. Previous investigations were based mainly on the materials collected from rodents (Kudryashova *et al.* 1978). Only one work covered bird chiggers and also reported a single case of chigger association with a reptile host (Vercammen-Grandjean *et al.* 1970). Iranian bat chiggers are represented by two species of the bat-infesting genus *Willmannium* (*W. aelleni* and *W. cavus iraniensis*) and one species of the bat-infesting genus *Chiroptella* (*C. vavilovi*). Moreover, *Schoutedenichia chilmirica* was described from a single specimen collected on the common pipistrelle and *Neoschoengastia elegans* was occasionally found on the trident leaf-nosed bat. Although coverage of the Iranian territory by collection localities is relatively good, it could not be regarded as comprehensive (Fig. 29). Moreover, some natural areas were omitted during collections, for example, high mountain territories. The maximal altitude, where chigger mites were found in Iran, was 2200 m a.s.l., while that country has enough number of peaks and mountain ranges higher than 3000 m. a.s.l. As regards the seasonal aspect of chigger fauna, the collections made by Neronov and Farang-Azad have been carried out from the end of May to December; thus, the spring peak of chigger abundance was missed out (Kudryashova *et al.* 1978).

The fauna of Iranian trombiculids includes representatives of all four subfamilies—Trombiculinae, Leeuwenhoeekiinae, Gahrlepiinae, and Apoloniinae—though the last one is represented by a single species. The most speciose chigger genera in Iran are *Neotrombicula* (14 species) and *Microtrombicula* (9 species). According to observations of Kudryashova *et al.* (1978), the highest chigger species diversity in Iran was revealed in mountain steppes (44 species). Tropical deserts, extratropical deserts, and forests are inhabited, respectively, by 10, 3, and 4 trombiculid species, and only one species (*Microtrombicula potamophila*) was found in large river valleys covered by specific tugai vegetation.



FIGURE 29. Map of collection sites.

The above mentioned authors estimated the rate of Iranian endemics among chigger species as exceeded 80%; we suppose that this number will decrease significantly after more extensive faunistic studies. Our calculation gives 61 species, i.e. 72% of all Iranian chiggers, currently known exclusively in Iran. Among the rest 24 species, the largest group consists of 15 trombiculids with ranges extending in western direction—to Asia Minor, Levant, Caucasus, Transcaucasia, Southern and Eastern Europe. Six of them (*Helenicula lukshumiae*, *Schoutedenichia montchadskyi*, *Microtrombicula azerbaijanica*, *M. traubi*, *Neotrombicula mofidii*, and *N. rostrata*) were recorded only in Iran and neighbouring Azerbaijan, sometimes also in Armenia, and nine (*Walchia cognata*, *Brunehaldia iranica*, *Schoutedenichia anatolica*, *Hirsutiella illogorensis*, *Leptotrombidium silvaticum*, *Neotrombicula delijani*, *N. heptneri*, *N. vulgaris*, and *Pentidionis agamae*) were found in more distant regions, sometimes in addition to bordering Azerbaijan or Turkmenistan. Taking into account that chigger fauna of Arabian Peninsula and Mesopotamia is almost unexplored at present, size of this group can increase due to possible finding of Iranian species there.

The group of species with ranges probably extending to Central Asia, i.e. east and north of Iran, includes *Brunehaldia schmuteri*, *Euschoengastia meshhedensis*, *Helenicula sparsa*, and *Willmannium aelleni*. Two species, *Susa vorax* and *Microtrombicula similata*, were found in Iran and neighbouring Turkmenistan only. The range of *Ericotrombidium jayewickremei* includes, in addition to Iran, South Asian countries, and *Helenicula kohlsi* was recorded in Southeastern and South Asia. One species, *Neotrombicula talmiensis*, has a very wide Eurasian areal.

TABLE 3. Wilcoxon Matched Pairs test for the difference between holotypes' measurements.

Variable	Valid N	T	Z	p-value
AW	36	284.00	0.7698	0.441408
PW	35	175.00	2.2931	0.021844
SB	32	142.50	2.2719	0.023092
ASB	35	251.50	1.0401	0.298306
PSB	39	237.50	2.1281	0.033326
SD	37	336.00	0.2338	0.815111
AP	32	191.50	1.3557	0.175204
AM	32	242.00	0.4114	0.680797
AL	36	210.00	1.9324	0.053311
PL	36	217.50	1.8146	0.069591
S	12	35.00	0.3138	0.753684
H	33	247.00	0.5986	0.549459
D _{min}	36	162.00	2.6865	0.007221
D _{max}	37	230.00	1.8330	0.066806
V _{min}	35	158.00	2.5715	0.010126
V _{max}	38	258.50	1.6243	0.104322
pa	43	127.00	4.1779	0.000029
pm	41	56.00	4.8529	0.000001
pp	43	124.00	4.2142	0.000025
Ip	43	91.00	4.6126	0.000004

Note: Variables were log-transformed. Tests significant at $p < 0.05$ are marked in bold.

Acknowledgements

We express our gratitude to Drs O.V. Voltzit and N.I. Kudryashova (Zoological Museum of Moscow University, Russia) who organized our access to the Museum collection. We are grateful to Dr Joanna Mąkol (Wrocław University of Environmental and Life Sciences, Wrocław, Poland) for her careful review of our manuscript and valuable comments. This research was supported by a grant from the Russian Foundation for Basic Research No. 17-54-560013 Iran_a and Iranian National Science Foundation (Grant No. 96003653).

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SUPPLEMENT. Measurements of holotypes: S—original; K—after Kudryashova.

Species	AW S	AW K	PW S	PW K	SB S	SB K	ASB S	ASB K	PSB S	PSB K	SD S	SD K	AP S	AP K
<i>Brunehaldia iranica</i>	65	64	71	73	23	25	30	28	18	17	48	45	15	14
<i>Brunehaldia silvatica</i>	77	76	86	87	36	34	30	31	20	19	50	50	17	17
<i>Brunehaldia zahedanica</i>	71	70	77	84	20	28	32	34	20	19	52	53	16	14
<i>Cheladonta firdousii</i>	60	62	70	81	23	25	23	28	21	22	44	50	29	28
<i>Cheladonta serrata</i>	42	42	61	62	18	17	18	20	16	17	34	37	30	31
<i>Chiroptella mozdorani</i>	63	62	71	70	26	27	34	34	13	11	47	45	35	34
<i>Chiroptella vavilovi</i>	40	45	66	78	22	24	31	42	18	14	49	56	37	42
<i>Derrickiella danieli</i>	54	53	76	76	25	25	22	19	18	17	40	36	26	28
<i>Derrickiella kolebinovae</i>	63	62	80	78	28	25	29	24	15	18	44	42	27	28
<i>Ericotrombidium biconcavum</i>	66	64	72	76	23	25	28	31	13	11	41	42	30	28
<i>Ericotrombidium iranicus</i>	69	67	79	78	25	25	29	28	13	11	42	39	25	25
<i>Euschoengastia meshhedensis</i>	73	73	101	106	34	36	26	28	12	11	38	39	20	20
<i>Helenicula goodorziani</i>	58	58	72	72	10	11	29	28	18	17	47	45	23	22
<i>Leptotrombidium subsilvaticum</i>	71	70	83	81	33	34	27	28	18	17	45	45	23	24
<i>Microtrombicula grossa</i>	40	42	44	48	19	20	20	25	23	20	43	45	19	17
<i>Microtrombicula media</i>	36	36	39	42	18	18	27	24	20	21	47	45	22	20
<i>Microtrombicula potamophila</i>	43	42	45	45	16	18	25	25	23	23	48	48	23	25
<i>Microtrombicula subtilissima</i>	34	34	36	36	17	17	20	22	22	20	42	42	19	20
<i>Microtrombicula tenera</i>	35	36	40	39	16	17	22	23	21	22	43	45	21	20
<i>Miyatrombicula nikitini</i>	70	70	86	84	31	29	31	31	32	31	63	62	24	22
<i>Neotrombicula blanfordi</i>	72	73	83	81	29	29	29	31	32	31	61	62	26	25
<i>Neotrombicula delijani</i>	72	73	91	92	31	31	27	28	27	28	54	56	28	28
<i>Neotrombicula faghghi</i>	61	60	74	72	29	25	24	22	35	32	59	55	30	28
<i>Neotrombicula heptimeri</i>	79	78	89	87	31	31	34	34	34	36	68	70	33	34
<i>Neotrombicula horti</i>	83	84	90	92	32	35	34	36	33	31	67	67	23	22
<i>Neotrombicula kermani</i>	79	81	99	104	34	36	36	36	32	31	68	67	33	32
<i>Neotrombicula mofidii</i>	63	52	79	72	27	25	25	22	34	32	59	55	31	28
<i>Neotrombicula sabzavari</i>	65	67	81	84	24	26	24	25	27	28	51	53	27	28
<i>Neotrombicula valenti</i>	80	83	90	92	32	33	38	39	32	33	70	73	31	30
<i>Neotrombicula valeri</i>	74	73	95	98	32	34	29	31	33	34	62	65	30	30
<i>Odontacarus apricus</i>	62	62	79	78	31	31	32	35	27	27	59	62	31	31
<i>Odontacarus dignus</i>	65	64	79	81	25	27	39	34	31	28	70	62	27	28
<i>Odontacarus efferus</i>	74	73	87	87	34	34	29	28	20	22	49	50	22	22
<i>Otorhinophila deserta</i>	62	63	90		38	40	32	33	20	16	52	49	33	
<i>Otorhinophila farhangazadi</i>	49	50	68		28	30	29	30	15	13	44	43	29	
<i>Schoutedenichia abharica</i>	52	53	72	73	36	36	23	22	16	14	39	36	33	34
<i>Schoutedenichia chilmirica</i>	66	67	86	87	49	48	34	34	18	19	52	53	44	42
<i>Schoutedenichia originale</i>	47	48			39	39	19	17		11			28	
<i>Schoutedenichia shirazica</i>	58	62	78	87	45	50	24	25	16	17	40	42	37	39
<i>Schoutedenichia zarudnyi</i>	46	45	61		31	31	24	24	9	12	33	36	33	
<i>Walchia montana</i>	43	45	57	59	33	35	20	20	41	45	61	65	37	36
<i>Walchia schelkovnikovi</i>	49	50	59	62	38	39	18	20	42	42	60	62	28	28
<i>Walchia valskayae</i>	50	45	59	56	41	36	20	20		36		56	32	31
<i>Willmannium cavus iraniensis</i>	61	61	76	81	27	29	31	32	16	13	47	45	35	34

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SUPPLEMENT (Continued)

Species	AM_S	AM_K	AL_S	AL_K	PL_S	PL_K	S_S	S_K	H_S	H_K	D _{min} _S	D _{min} _K	D _{max} _S	D _{max} _K
<i>Brunealdia iranica</i>	31	31	36	42	52	56	26	41	41		32	31	41	42
<i>Brunealdia silvatica</i>	38	42	45	50	58	62	43	42	53		43	42	58	56
<i>Brunealdia zahedanica</i>	35	36	43	42	62	62		36	46		34	36	47	50
<i>Cheladonta firdousii</i>	24	22	18	17	35	36	30	36	36	38	29	28	38	36
<i>Cheladonta serrata</i>	25	28	20	22	32	34		31	31	33	19	17	30	31
<i>Chiroptella mozdorani</i>	49	48	38	36	54	50		70	49	48	31	31	50	50
<i>Chiroptella vavilovi</i>	50	50	27	28	65	67			50	50	32	31	47	50
<i>Derrickiella danieli</i>	31	28	24	22	35	34	37		40	39	23	22	38	36
<i>Derrickiella kolebinovae</i>	36	34	25	28	34	34	34		40	41	23	22	36	36
<i>Ericotrombidium biconcavum</i>	25	25	31	34	35	34		62	33	31	27	28	43	39
<i>Ericotrombidium iranicus</i>	29	31	36	34	44	45	43	42	43	42	35	34	43	42
<i>Euschoengastia meshhedensis</i>	32	34	32	31	67	70	43	42	76	76	53	48	72	70
<i>Helenicula goodorziani</i>	34	33	42	42	41	42	22		42	42	25	19	38	33
<i>Leptotrombidium subsilvaticum</i>	52	50	41	42	65	64		59	60	59	43	45	61	59
<i>Microtrombicula grossa</i>	30	28		17	32	34		42	32	31	25	25	31	31
<i>Microtrombicula media</i>	24	28	20	22	32	34	47	48	32	34	27	28	33	34
<i>Microtrombicula potamophila</i>	27	31	27	28	32	34	36	56	43	42	29	28	38	34
<i>Microtrombicula subtilissima</i>	27	25	20	20	33	31	36	42	40	36	25	22	31	31
<i>Microtrombicula tenera</i>	27	28	19	20	32	34		42	40	36	22	22	31	28
<i>Miyatrombicula nikitini</i>	31	29	29	29	32	34		70	33	34	25	25	31	31
<i>Neotrombicula blanfordi</i>	29	28	39	36	41	42	59	64	44		41	31	45	48
<i>Neotrombicula delijani</i>	34	34	32	31	45	45	65	64	45	45	37	36	45	42
<i>Neotrombicula faghihi</i>	31	25	35	32	48	48		55	48	45	36	32	47	40
<i>Neotrombicula heptneri</i>	43	42	47	42	72	76	76	70	69	70	49	50	64	59
<i>Neotrombicula horti</i>	40	42	54	56	72	73	83	76	75	73	52	53	69	70
<i>Neotrombicula kermani</i>	40	39	46	48	65	64			71	73	52	50	65	59
<i>Neotrombicula mofidii</i>	27	25	31	28	40	40	58	55	41	38	33	30	43	38
<i>Neotrombicula sabzavari</i>	26	28	27	31	46	48	63	64	46	48	29	31	41	45
<i>Neotrombicula valenti</i>	44	43	50	50	67	66	95		68	66	44	43	58	56
<i>Neotrombicula valeri</i>	36	36	40	42	57	56	85	84	55	56	41	42	49	53
<i>Odontacarus apricus</i>	45	45	32	34	39	39		76	50	50	28	28	43	45
<i>Odontacarus dignus</i>	53	53	45	48	38	36		98	57	56	27	28	49	48
<i>Odontacarus efferus</i>	45	42	34	34	54	53	85	84	52	56	27	28	43	42
<i>Otorhinophila deserta</i>	36	30	26	30	37	36		56	36	36	23	23	36	33
<i>Otorhinophila farhangzadi</i>	29	30	23	23	34	33	22	39	38	35	29	26	38	33
<i>Schoutedenichia abharica</i>	29	31	22	31	37	39		36	36	34	22	22	31	34
<i>Schoutedenichia chilimirica</i>			31	28	42	42		46	46	42	27	22	43	42
<i>Schoutedenichia originale</i>	18	17	16	14	26	28		31	31	28	16	14	23	22
<i>Schoutedenichia shirazica</i>	18	17	17	17	25	25	30	30	30	31	20	20	29	28
<i>Schoutedenichia zarudnyi</i>	18	22	16	20	29	28	32	31	32	34	19	17	25	25
<i>Walchia montana</i>			25	28	27	31		34	34	36	23	25	26	34
<i>Walchia schelkovnikovi</i>			24	28	25	28		25	25	28	26	20	34	28
<i>Walchia valskeyae</i>			29	28	25	25		27	27	28	22	20	25	25
<i>Willmannium cavus iranienensis</i>	41	41	33	32	47	45		48	48	48	30	31	45	48

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Species	V _{min} _S	V _{min} _K	V _{max} _S	V _{max} _K	pa_S	pa_K	pm_S	pm_K	pp_S	pp_K	Ip_S	Ip_K
<i>Brunehaldia iranica</i>	22	20	37	36	254	277	230	235	254	272	738	784
<i>Brunehaldia silvatica</i>	25	28	43	42	292	314	268	286	290	314	850	914
<i>Brunehaldia zahedamica</i>	25	28	43	42	261	308	236	274	274	316	771	898
<i>Cheladonta firdousii</i>	20	20	35	34	252	269	200	216	232	249	684	734
<i>Cheladonta serrata</i>	17	14	26	28	232	249	187	196	212	224	631	669
<i>Chiroptella mozdorani</i>	25	22	45	42	340	356	311	319	333	339	984	1014
<i>Chiroptella vavilovi</i>	30	31	45	50	299	372	292	322	342	364	933	1058
<i>Derrickiella danieli</i>	20	17	31	28	256	277	207	227	232	255	695	759
<i>Derrickiella kolebinovae</i>	23	20	30	28	266	266	230	227	257	263	753	756
<i>Ericotrombidium biconcavum</i>	26	25	41	39	236	263	221	249	254	272	711	784
<i>Ericotrombidium iranicus</i>	29	28	38	36	322	314	283	286	324	325	929	925
<i>Euschoengastia meshhedensis</i>	36	34	61	62	288	308	261	274	295	316	844	898
<i>Helenicula goodorziani</i>	19	17	32	28	288	286	254	255	288	274	830	
<i>Leptotrombidium subsilvaticum</i>	32	28	50	48	241	277	223	255	254	274	718	806
<i>Microtrombicula grossa</i>	17	17	25	25	221	246	193	210	227	238	641	694
<i>Microtrombicula media</i>	17	20	24	28	216	238	187	204	218	230	621	672
<i>Microtrombicula potamophila</i>	23	20	29	28	261	280	214	235	254	274	729	789
<i>Microtrombicula subtilissima</i>	16	17	25	22	209	216	169	185	202	193	580	594
<i>Microtrombicula tenera</i>	16	17	22	22	225	227	185	190	207	216	617	633
<i>Myatrombicula nikitini</i>	19	20	27	28	301	286	229	255	266	288	749	829
<i>Neotrombicula blanfordi</i>	27	25	42	42	301	305	259	266	297	314	857	885
<i>Neotrombicula delijani</i>	27	28	41	39	272	286	236	260	286	297	794	843
<i>Neotrombicula faqihli</i>	23	20	43	38	293	282	243	232	288	270	824	784
<i>Neotrombicula heptneri</i>	35	28	50	48	414	384	353	328	401	370	1168	1082
<i>Neotrombicula horti</i>	41	42	67	59	349	381	310	336	358	392	1017	1109
<i>Neotrombicula kermani</i>	34	31	52	53	297	342	247	294	315	356	859	992
<i>Neotrombicula mofidii</i>	28	22	34	30	290	262	248	230	284	258	822	750
<i>Neotrombicula sabzavari</i>	25	25	37	34	279	308	232	260	279	305	790	873
<i>Neotrombicula valenti</i>	34	33	53	36	398	429	344	366	398	429	1140	1224
<i>Neotrombicula valeri</i>	28	28	54	45	315	342	263	300	310	342	888	984
<i>Odontacarus apricus</i>	25	28	40	42	376	350	308	308	365	361	1049	1019
<i>Odontacarus dignus</i>	24	22	38	42	407	398	346	353	412	420	1165	1171
<i>Odontacarus efferus</i>	23	20	34	39	292	288	245	263	275	288	812	839
<i>Otorhinophila deserti</i>	22	20	32	26	351	360	311	304	356	360	1018	1024
<i>Otorhinophila farhangazadi</i>	19	20	34	28	299	320	257	277	317	327	873	924
<i>Schoutedenichia abharica</i>	22	20	26	28	218	221	187	199	223	232	628	652
<i>Schoutedenichia chilmirica</i>	22	22	30	31	340	370	310	319	360	375	1010	1064
<i>Schoutedenichia originale</i>	22	22	30	20	243	235	202	202	216	218	661	655
<i>Schoutedenichia shirazica</i>	19	20	25	28	238	255	207	227	239	266	684	748
<i>Schoutedenichia zarudnyi</i>	20	17	23	22	225	246	191	210	229	230	645	686
<i>Walchia montana</i>	14	14	22	25	203	227	160	188	196	232	559	647
<i>Walchia schelkovnikovi</i>		14		22	193	196	153	174	189	193	535	563
<i>Walchia valskeyae</i>		14		20	185	199	158	162	196	192	539	553
<i>Willmannium cavus iraniensis</i>	23	22	43	45	292	308	256	279	295	310	843	897